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THE

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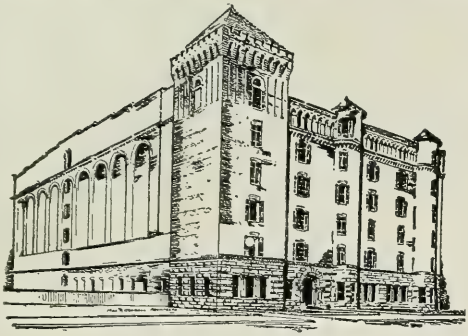

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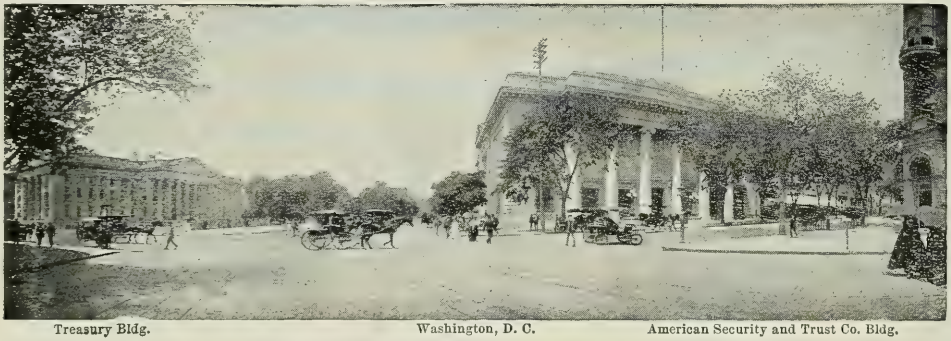

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VOL. XIX, No. 1 WASHINGTON JANUARY, 1908

THE NATIONAL GEOGRAPHIC MAGAZINE

IN THE SAVAGE SOUTH SEAS

BY BEATRICE GRIMSHAW

Miss Grimshaw is an enterprising young English woman who recently passed several years in Fiji and the New Hebrides on a search for good opportunities for investment. She explored many unknown sections of these islands and has written a delightful narrative of her travels and experiences, "Fiji and Its Possibilities." The following article is abstracted from this book, and is printed here through the courtesy of the publishers, Messrs Doubleday, Page & Company of New York, by whom all the extracts and illustrations are copyrighted.

FIJI is a British colony, situated in the southwest Pacific, lying between the 15th and 22d parallels of south latitude and between 157 east and 177 west longitude. It consists of 155 islands, with a total area of 7,400 square miles. Most of the land is contained in the two great islands of Viti Levu (Great Fiji) and Vanua Levu (Great Land), which account for 4,112 and 2,432 square miles respectively. These two islands are exceptionally well wooded and watered, and could, it is said, support three times the population of the whole group. Viti Levu is in every way the most important island in the archipelago. It contains the seat of government, the principal harbors, all the roads, and much the greater part of the colony's trade. There is one town in the group besides Suva—Levuka, the capital of former days, on the small island of Ovalau.

The climate is certainly hot, though the thermometer does not rise to any extraordinary heights. During the three hottest months—January, February, and March—the highest shade temperature ranges between 90° and 94° Fahr., and the lowest between 67° and 72°, roughly speaking. In the cooler months of June, July, and August, 59° and 89° are the usual extremes. The air is moist, as a rule, and in Suva, at all events, one may safely say that a day without any rain is almost unknown. On the northern side of Viti Levu the climate is a good deal drier and in consequence less relaxing. Dysentery is fairly common, but there is no fever to speak of, and the climate, on the whole, is considered healthful. Mosquitoes are so troublesome that most of the better class of private houses have at least one mosquito-proof room, with doors and windows protected by wire gauze.

As we pass down the main street of the capital, the curious mixture of the population is very noticeable—whites, half-castes, Samoans, Indians, Chinese,

and, more conspicuous than any, the Fijians themselves—tall, magnificently built people of a color between coffee and bronze, with stiff, brush-like hair, trained into a high "pompadour," clean shirts and smart short cotton kilts, and a general aspect of well-groomed neatness. They do not look at all like "savages" and, again, they have not the keen, intellectual expression of the Indians or the easy amiability of the Samoan type of countenance. They are partly Melanesian, partly Polynesian in type, and they form, it is quite evident, the connecting link between Eastern and Western Pacific.

East of Fiji, life is one long, lotus-eating dream, stirred only by occasional parties of pleasure, feasting, love-making, dancing, and a very little gardening work. Music is the soul of the people, beauty of face and movement is more the rule than the exception, and friendliness to strangers is carried almost to excess. Westward of the Fijis lie the dark, wicked, cannibal groups of the Solomons, Banks, and New Hebrides, where life is more like a nightmare than a dream; murder stalks openly in broad daylight, people are nearer to monkeys than human beings in aspect, and music and dancing are little practiced and in the rudest possible state.

In Fiji itself the nameless, dreamy charm of the eastern islands is not; but the gloom, the fevers, the repulsive people of the west are absent also. Life is rather a serious matter for the Fijian, on the whole; he is kept in order by his chiefs and by the British government, and has to get through enough work in a year to pay his taxes; also, if the supply of volunteers runs short, he is liable to be forcibly recruited for the armed native constabulary, and this is a fate that oppresses him a good deal—until he has accustomed himself to the discipline of the force, when he generally makes an excellent soldier. But, all in all, he has a pleasant time, in a pleasant, productive climate, and is a very pleasant person himself, hospitable in the highest degree, honest, good-natured, and clever with his hands, though of a less highly intellectual type than the Tongan or the Samoan.

A MARVELLOUS TRANSFORMATION

The whole penal apparatus is one gigantic jest, and is regarded as such by most of the whites and not a few of the natives.

To begin with, there is hardly any real crime, what there is being furnished chiefly by the Indian laborers employed on the estates of the Colonial Sugar Refining Company. The Fijians themselves, though less than two generations removed from the wild and wicked days of the Thakombau reign, are an extremely peaceable and good-natured people. In the fifties and sixties, and even later, murder, torture, and cannibalism were the chief diversions of a Fijian's life, and the power of working one's self into a more violent and unrestrained fit of rage than any one else of one's acquaintance was an elegant and much-sought-after accomplishment. This change, effected largely by the work of the missionaries, but also by the civilizing influences of the British government and of planters and traders innumerable, is most notable. Nothing can be more amiable and good-natured than the Fijian of today; no colored citizen in all the circle of the British colonies is less inclined to crime.

Yanggona (the "kava" of the eastern Pacific) is the universal drink of Fiji. It is the hard, woody root of a handsome bush (the *Piper methysticum*) which grows freely in the mountains. The Fijians prepare the root by grating or pounding, pour water over the pounded mass, and strain it through a wisp of bark fiber. The resulting drink looks like muddy water and tastes much the same, with a flavor of pepper and salt added. One soon gets to like it, however, and drunk in moderation it is extremely refreshing and thirst-quenching. The Fijians do not drink moderately, I regret to say; they often sit up all night over their yanggona, drinking until they

THE VILLAGE PLATE, FIJI

A ROOT OF YANGGONA FROM WHICH THE INTOXICATING DRINK OF THE FIJIAN ISLANDERS IS MADE

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VANILLA PLANT AND BEAN

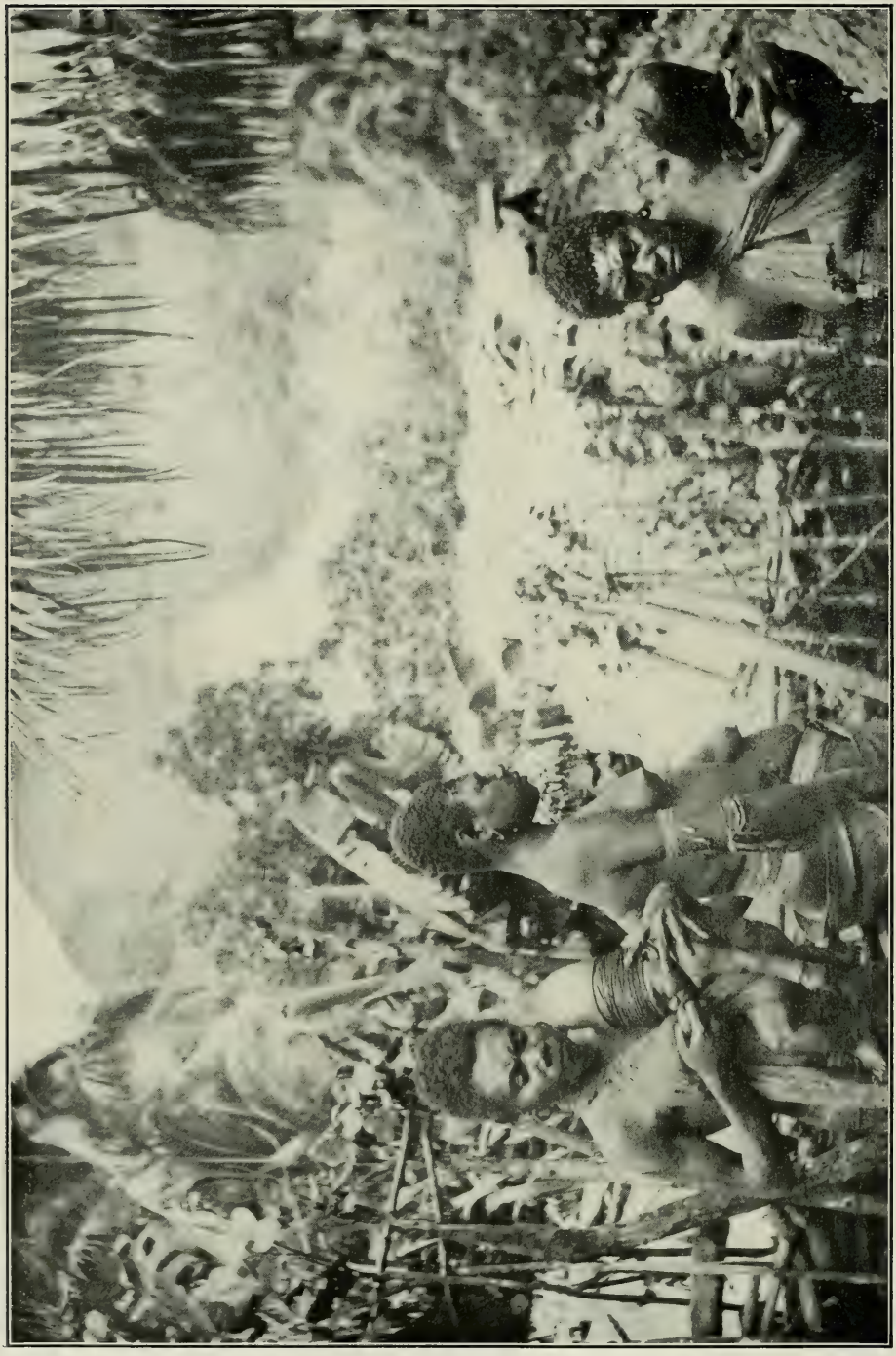
are stupefied and sleepy and quite unable to walk, for yanggona taken in excess paralyses the legs for an hour or two, even though the head may be quite clear. The British government has forbidden the ancient method of preparing the root, in which it was chewed and spat out into the bowl, instead of being pounded. For all that, yanggona is very frequently chewed at the present day, when no white people are about.

There are no woods in the world more beautiful and valuable than the woods of Fiji, although want of capital and, to some extent, want of enterprise has prevented their becoming widely known. "Bua-bua," the boxwood of the Pacific, is very common and grows to an immense size. It weighs 80 pounds to the cubic foot, is very hard, and most durable. The "cevua," or bastard sandalwood, a strong-scented, very durable wood, grows freely in logs one foot and two feet in diameter; and the real sandalwood is also found, though not plentifully. Another useful wood is "vesi," which grows two and three feet in diameter. It is much like teak—hard, heavy, and extremely lasting in the ground or out of doors; it is also rich-colored and very easily polished. The "dakua" is one of the most valuable woods; it much resembles the New Zealand kauri pine and grows to a large size, sometimes six and seven feet in diameter. It contains a great deal of gum, and quantities of this can be taken out of the ground wherever a tree

DRYING VANILLA, FIJI

A FIJIAN IN SUNDAY DRESS, FIJI

A FIJIAN IN FESTIVAL DRESS



INFANT HEAD-BINDING TO MAKE THE HEAD CONICAL, NEW HEBRIDES (SEE PAGE 17)

has been. The timber is useful for almost any purpose. The "yaka" might be called the rosewood of the Pacific, if it did not also, in some degree, resemble mahogany. It is a wood of the greatest beauty, being exquisitely marked and veined and taking a high polish. This is a wood that certainly should be known to cabinet-makers, and no doubt will be later on. The "savairabunidamu," a curious dark-red wood, is extraordinarily tough, and can be steamed and bent to almost any shape—a valuable quality. The "bau vundi" is a kind of cedar, very workable and most lasting. A singularly beautiful timber is the "bau ndina," which is deep rose-red in color, tough and firm, and suitable for engravers' use. Besides these, there are more than sixty varieties of other woods, all useful or beautiful and most to be found in great profusion. The quantities available are very large.

UNCANNY INSECTS

The wonderful stick insects of Fiji, familiar in all home museums, are found on nearly every cocoanut tree. They are very ill-smelling, and squirt a fetid fluid at one's eyes, if handled. Leaf insects I never saw, except when the natives caught and brought them to me, but all the guava bushes have them, although a white man's eye can seldom distinguish them from their shelter. They are most miraculous and uncanny creatures, absolutely leaves endowed with the power of motion, so far as the most scrutinizing eye can see, for even their legs and heads are a precise copy of stalks and small leaflets.

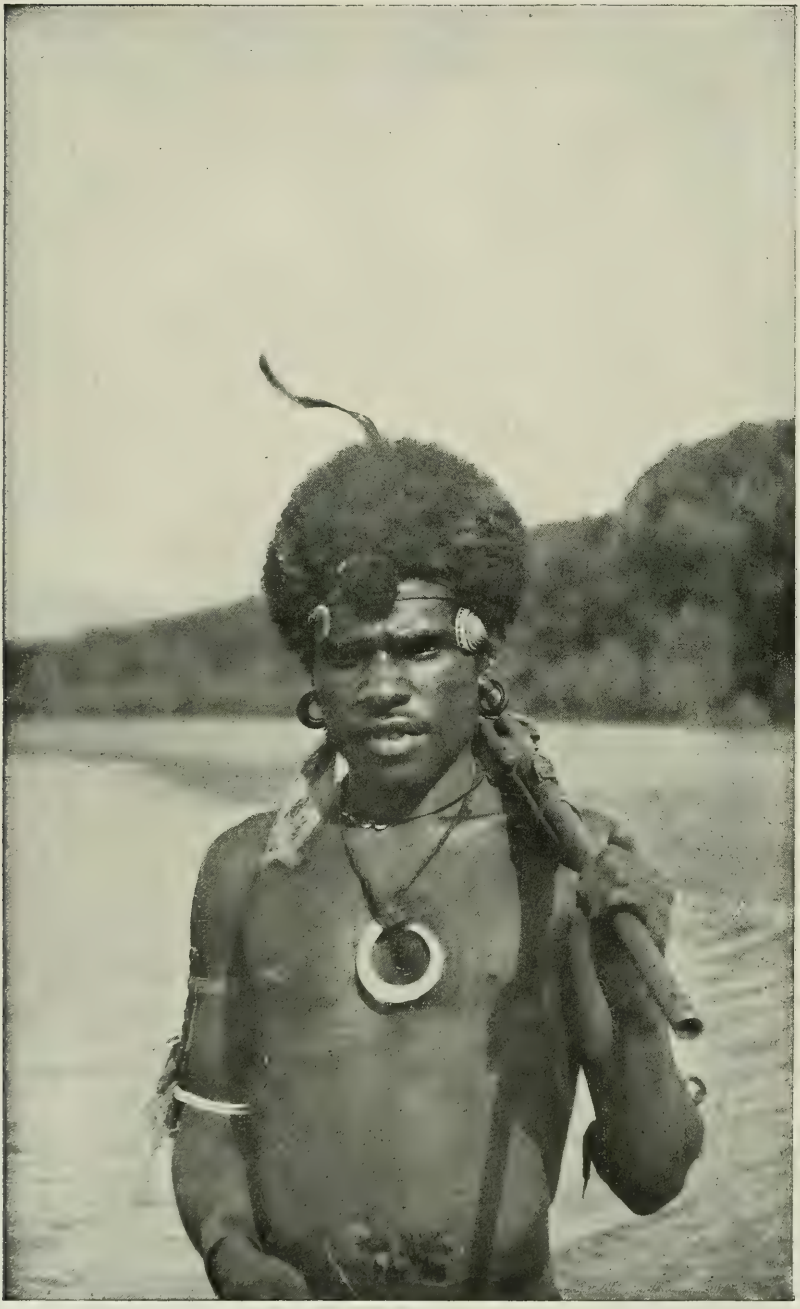
A certain enterprising man and his wife, who were getting rich very slowly indeed keeping a country store, resolved to try whether the magic bean might not do for them what it had done for others in South America and the West Indies. So, in the face of some actual opposition and continual ridicule, they expended their little capital of 250 pounds on the leasing of eight acres of warm, sheltered valley land and the planting of 9,000 cuttings of good Mexican vanilla. For three years, with the assistance of one Fijian and occasionally a couple of Indians, the industrious couple kept their plants weeded and tended, and latterly looked to the fertilizing of the flowers—a rather tedious business, done every day by hand, in the earliest hours of the morning; and at the end of the three years the reward came, for the plants were yielding splendidly and were expected to give about 9,000 pounds of dried beans, bringing an average price of 10 shillings a pound. The fruits of the first season were just coming in when I visited the plantation, and the lucky young couple were counting up their gains, present and future, with joyful hearts.

SULLEN NEW HEBRIDES

The New Hebrides are not very far from Australia—only about 1,500 miles northeast of Sydney—and they are by no means an insignificant group, since they extend over seven hundred miles of sea, and some of the islands are sixty and seventy miles long.

The native population is variously estimated at 60,000 to 100,000, and there are about three hundred French settlers and less than two hundred British and colonials, most of whom are missionaries.

The islands are extremely beautiful and remarkably fertile. Three crops of maize a year can be raised with little trouble. Coffee is largely grown, and there is none better in the Pacific. Millet, for broom-making, grows readily and pays well. Copra can be produced in the New Hebrides to better advantage than in any of the British Pacific colonies, the Solomons only excepted. Eighty nuts a tree is considered a very good average over the greater part of the South Seas. In the New Hebrides the figures I received seemed almost beyond belief, but, even allowing for much exaggeration, it seems certain that the average yearly crop of nuts must be quite twice as large as in Fiji, the Cook Islands, or Tonga. I saw more than one tree that had three hundred nuts at once upon it (as I was in-

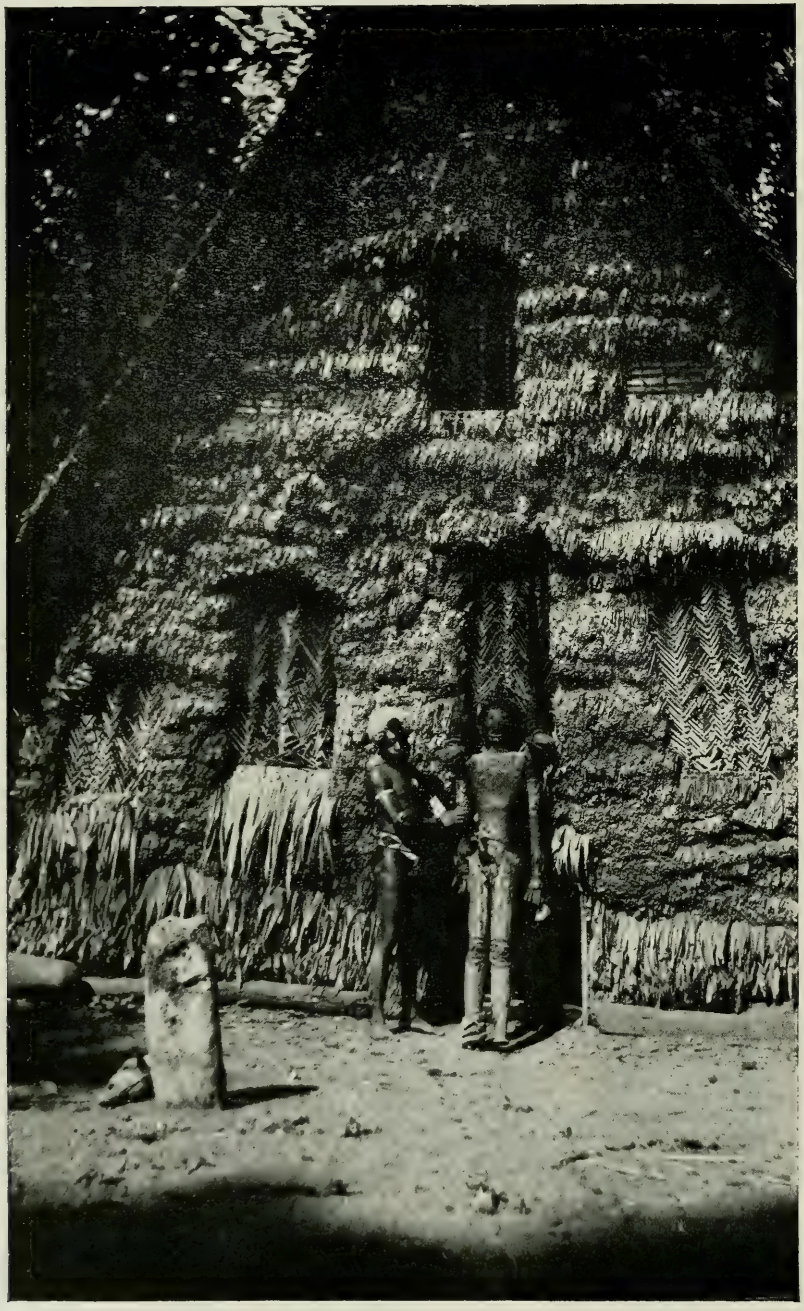


MALEKULA WARRIOR, NEW HEBRIDES

THE WOMEN'S DANCE

DANCING AND SINGING

SCENES IN NEW HEBRIDES



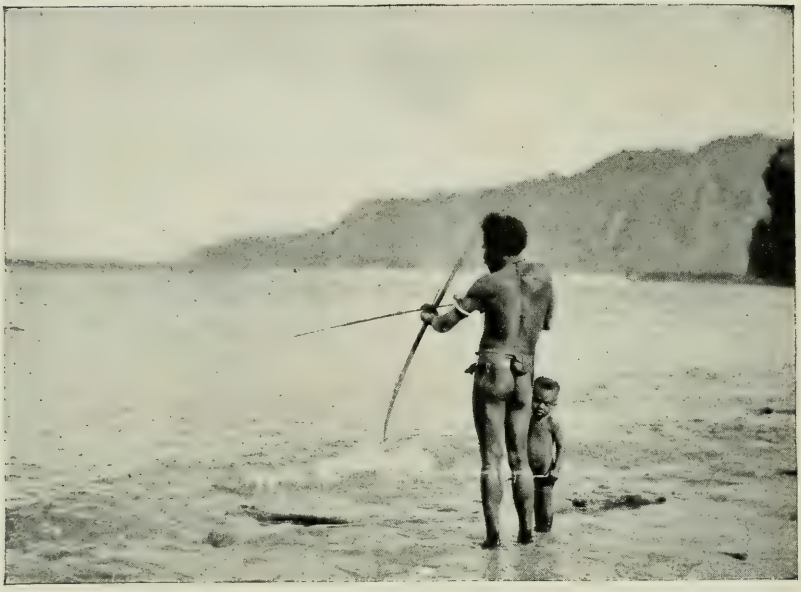
BRINGING OUT THE MUMMY FROM THE "HAMAL" (SEE PAGE 17)

TYPICAL IDOLS IN A NEW HEBRIDES VILLAGE (SEE PAGE 18)

POISONED ARROWS

A NOTORIOUS CANNIBAL, NEW HEBRIDES

IN THE YAM FIELDS, NEW HEBRIDES



SHOOTING FISH, NEW HEBRIDES

formed; I did not count them, since that would have involved going up the tree with a paint-pot and a brush to mark them off), and I heard of one or two that had four and even five hundred.

This is a more important matter than might appear at first, for the copra trade is the true gold-mine of the Pacific. The oil that is expressed from the dried nut kernels is used in many different departments of commerce, especially in soap-making, and the demand constantly exceeds the available supply—so much so that the well-known firm of Lever Brothers have been buying up large tracts of land in the British Solomons to keep their factories supplied.

The popular idea of the New Hebridean, for a wonder, comes very near the truth. He is supposed to be, and is, treacherous, murderous, and vindictive. He is to the full as sensual and indolent as the Eastern Islander and lacks almost every virtue possessed by the latter. He is almost inconceivably clumsy and stupid in a house or on a plantation; almost devoid of gratitude, almost bare of natural affection; ready to avenge the smallest slight by a bloody murder, but too cowardly to meet an enemy face to face. Yet there are a few things to say in his favor. He is wonderfully honest—so much so that in the bush districts a coin or a lump of tobacco found by the wayside will never be appropriated by the finder, but will be placed in a cleft stick at the edge of the track, for the real owner to take the next time he may chance to pass that way; and if the possessor never returns, the "find" will remain where it has been placed until some white man or some "civilized" native from a plantation passes by and appropriates it.

One of the strange things seen in one village was the collections of boars' tusks belonging to the chiefs. These were displayed on a long stand that exactly resembled eight or ten bazaar stalls joined together. There were some hundreds of them placed in long rows—how many exactly I had not time to count, as I heard that the canoes were just coming home from the mainland and I wanted to be on the shore to meet them. Many of the tusks were curved into a complete

TANNESE SCAR-TATTOOING, NEW HEBRIDES

LOOKING OUT FOR TROUBLE

THE ALLIES COMING IN

Villages are surrounded by stockades made of interwoven reeds

double circle. These are greatly prized, but are only obtained at the cost of much suffering to the unlucky pig that furnishes them. He is tied up in a house and never allowed to wander forth, for fear of destroying his tusks. From each side of the jaw the teeth that oppose the tusk and prevent its going too far are removed, so that in time it grows right round through the unlucky animal's flesh and provides a splendid double armlet for the native who owns the pig.

In Malekula, one of the larger islands of the New Hebrides, many a married woman was distinguished by a dark gap in the ivory-white teeth of her upper jaw, where the two middle incisors had been knocked out with a stone. This extremely unpleasant substitute for the wedding ring is found in various parts of Malekula. The operation is performed by the old women of the tribe, who greatly enjoy the revenge they are thus enabled to take on the younger generation for the injury once inflicted by their elders upon them.

By a good deal of worrying and a little tobacco, I persuaded the villagers to show me a mummy from one of their "hamals," or sacred houses.

It appeared to be the stuffed skin of a man fastened on poles that ran through the legs and out at the shoulders. The fingers of the hands dangled loose like empty gloves. The hair was still on the head, and the face was represented by a rather cleverly modeled mask made of vegetable fiber, glued together with bread-fruit juice. In the eye-sockets the artist had placed neat little circular coils of cocoanut leaf, and imitation bracelets were painted on the arms. The face and a good part of the body were colored bright red. The ends of the stretcher-poles were carved into a curious likeness of turtle heads. Standing up there in the dancing light and shade of the trees, against the high brown wall of the hamal, the creature looked extraordinarily weird and goblin-like. It had a phantom grin on its face, and its loose skinny fingers moved in the current of the strong trade wind—it certainly looked more than half alive.

MAKING A CONICAL HEAD

It was while I was staying with the kindly and hospitable B——s that I had the chance of photographing what I believe has never been photographed before—the making of a conical head.

A good many years ago certain men of science who had procured skulls from all parts of the world were struck with the extraordinary egg-like shape of some that came from Malekula. No one knew much about the people who owned these remarkable heads, and science forthwith erected rather a pretty theory on the basis furnished by the skulls, placing the owners on the lowest rung of the human ladder and inferring that they were nearer to the ape than any other type at that time known.

Later on some one happened to discover how it was that the skulls came to show this peculiar shape, and the marvel vanished when it was known that compression in infancy was the cause. It is still, however, a thing curious enough. Several other nations compress their infants' heads, but none seems to attain quite such a striking result as the Malekulan, in those districts where the custom is systematically practiced. A conical head, when really well done, rises up to a most extraordinary point, and at the same time retreats from the forehead in such a manner that one is amazed to know the owner of this remarkable profile preserves his or her proper senses, such as they are. I could not hear, however, that the custom was supposed to affect the intellect in any way.

"It would be hard to affect what they haven't got," a trader observed on this subject.

The conical shape is produced by winding strong sinnet cord spirally about the heads of young babies, and tightening the coils from time to time. A piece of plaited mat is first put on the head, and the cord is coiled over this, so as to give it a good purchase. The crown of the

head is left to develop in the upward and backward fashion that is so much admired. One fears the poor babies suffer very much from the process. The child I saw was fretful and crying and looked as if it were constantly in pain; but the mother, forgetting for the moment her fear of the strange white woman, showed it to me quite proudly, pointing out the cords with a smile.

She had a normally shaped head herself, and it seemed that she had suffered by her parents' neglect of this important matter, for she was married to a man who was of no particular account. A young girl who was standing beside her when I took the photograph had evidently had a more careful mother, for her head was almost sugar-loaf-shaped. It is interesting to know that this well-brought-up young woman had married a chief.

STRANGE WOODEN IMAGES OF ANCESTORS

A visitor to the island of Malekula, New Hebrides, is greatly impressed by the huge images in the amils, or village squares; they are rudely carved, barbarously painted, and are called "temes," or images of the dead.

These images differ greatly from each other. Some are made of wood, others of the butt of a fern tree; some are painted in scrolls or stripes, others in rings; some display only a head, others are rude effigies of the whole human body; in some the eyes are round, in others oval-shaped.

The colors employed in olden times were coral lime, yellow ocher, a mineral green, and charcial. Civilization, through the trader, has supplanted the green and yellow with the laundry blue and red lead. They are more brilliant, no doubt, but less in keeping with their surroundings.

A remarkable fact is, that although the images are rude in design and out of all proportion, they are real attempts at portraying the human figure. Every part is carefully put in; yet, with the exception of the boar's tusks on one, there is an entire absence of the combination of the human and animal, as, *e. g.*, in the Hindu pantheon. This is possibly due to imperfect and rudimentary notions of divinity, if these are at all gods. There are no figures, like the Ephesian Diana, denoting the nourishment of man and beast from many-breasted Nature. There are no many-headed or many-eyed emblems of the omnipotence or omniscience of the gods. We are still among the lowest and rudest forms of religion.

The people of Tanna, another island of New Hebrides, are a remarkable race and, in spite of their murderous tendencies, have a great deal more character than the Malekulans. Queenlanders know them well, for thousands of Tannese have been employed in the Queensland sugar country from time to time. Whatever they may have gathered of civilization in Australia stays with them but a little while after they leave. On landing they generally take off all their clothes, go back to their villages, paint their faces, and take a hand in the latest tribal row, only too glad to be back to savagery again.

Like the Fijians, who were at one time the fiercest and most brutal cannibals of the Pacific, and who are now a peaceful and respecting nation, worthy of the crown that owns them, the Tannese will in all probability "train on" into a really fine race, as soon as they can be restrained from continuously murdering each other on the slightest provocation, and induced to clean their houses and themselves and live decently and quietly.

The yam gardens were weariful pictures. In one that we passed nearly all the women had blackened faces, the Tannese sign of mourning. The yam garden was a waste of parched and powdery earth; the bush around was burned yellow and brown; the pale-blue sky above quivered with the fierce midday heat. Stolid, ugly, and streaming with sweat, the women worked dully on, breaking off for a few minutes to stare and wonder at the visitor, and then continued their heavy task.

BUSHMEN COMING TO SEE A WHITE CHILD

FASHIONS IN ERROMANGA, NEW HEBRIDES

STUDIES ON THE RATE OF EVAPORATION AT RENO, NEVADA, AND IN THE SALTON SINK

By Professor Frank H. Bigelow

U. S. Weather Bureau

THE southwestern United States, from southern Utah and Colorado, including Arizona and New Mexico, to southern California, is the wonderland of North America. Here are found several hundred square miles of petrified forests, the surface of the ground being covered with agate tree trunks and chips; the largest natural bridge in the world, 500 feet span, 200 feet high, and 600 feet wide; the greatest examples of volcanic action, with 50 miles of lava in sheets 1,500 feet thick; the most impressive villages of cave-dwellings in the world; the many-storied cliff-houses of aboriginal architecture; the communes or town republics and the pueblos of the Acoma and Moki Indians; the most notable tribes of nomad Indians, the Navajos and Apaches, who are the best fighters of the savage world; and the remarkable ruins of the great stone and adobe churches of the Franciscan missionaries.

The greatest wonder of all is the work of erosion performed by the Colorado River in its course from Utah to the Gulf of California, a distance of 2,000 miles. At present it flows through the Grand Canyon in a narrow gorge about 1,300 feet deep below the first level of the valley; but this valley itself is surrounded by cliffs and pinnacles rising 5,000 to 6,000 feet above the water of the river; also, passing from the rim of the canyon along the open prairie to the mesas, or tables, still marking the ancient levels of the plateau, yet another thousand feet must be added. The geological evidence shows that more than 30,000 feet of rock have been carried away in some places, and that over a region covering 200,000 square miles at least 6,000 feet have been transferred to the ocean.

The cutting of the gorge through 800 feet of black gneiss, 800 feet of quartz, 500 feet of sandstone, 3,600 feet of limestones of various kinds, and 1,000 feet of gypsum mixed with limestone is a manifestation of water power hard to appreciate.

The Colorado River drains the snow water of the Rocky Mountains and the plateau southwestward, and has gradually transported this immense mass of material into the Gulf of California. In ancient days this gulf extended about 150 miles farther north, between the San Jacinto and the San Bernardino Mountain ranges, and the beach lines of this old sea can be readily traced upon the sides of the mountains 15 feet above sea-level. The river entered the old Gulf of California at Yuma, Arizona, and it has gradually built a delta of silt and débris directly across the gulf, so that the northern end of the ancient depression has been entirely cut off from the Pacific Ocean and its waters. This sink is now about 285 feet below sea-level in the Salton Sea, while the delta floor is 20 to 40 feet above sea-level.

The waters of the Colorado River pass through a narrow channel at the heads above Yuma and flow along the top of the delta in channels which are readily shifted to the north or the south, this being the natural way to spread more soil over an ever-widening delta back. The gradient of flow is steeper northward to the Salton Sink than it is southward to the Gulf of California, and hence any flowing of the river to the deep sink is

Photo by F. H. Bigelow

THE SALTON SEA AND THE SALT CREEK TRESTLE

Of the Southern Pacific Railroad, about 800 feet long. The water is too rough on calm days to float pans; the waves are from 8 to 12 feet high in heavy weather

accompanied by a series of rapids, in consequence of which the soluble soil of the delta is peculiarly subjected to rapid cutting and erosion and the soil is transported northward in great masses. This alternate flowing of the river to the north and south has occurred many times in geological history, the Salton Sea forming suddenly and drying out more gradually by the slower process of evaporation, though this is unusually rapid in that hot and arid climate.

The desert regions east of the Coast Range of southern California are caused by the fact that the mountains cut off the moist west winds from the Pacific Ocean, while the entire region is too far west of the Gulf of Mexico to receive any moisture from its southerly winds.

TEN CROPS OF ALFALFA A YEAR

The latest overflow of the Colorado River into the Salton Sink occurred in 1905-1906, as the result of certain irrigation projects. The soil of the delta, being the product of the mountains of Utah, New Mexico, and Arizona, is particularly fertile, when supplied with irrigated water, on account of the continuous high temperature, which ranges from 120° in July and August down to about 20° to 30° in January and February. This is shown by the fact that about ten crops of alfalfa can be cut annually from the same ground without fertilization, and that crops of canteloupes are ready for market as much as 30 days earlier than any other region of the United States, all other vegetable crops flourishing in the same abundant ratio.

The Department of Agriculture finds that its new date farms at Indio and Mecca, just north of the Salton Sea, are producing dates and figs of a very superior quality, and it is supposed that in less than 20 years that region will provide all the dates consumed in the United States, as much as 20,000,000 pounds annually.

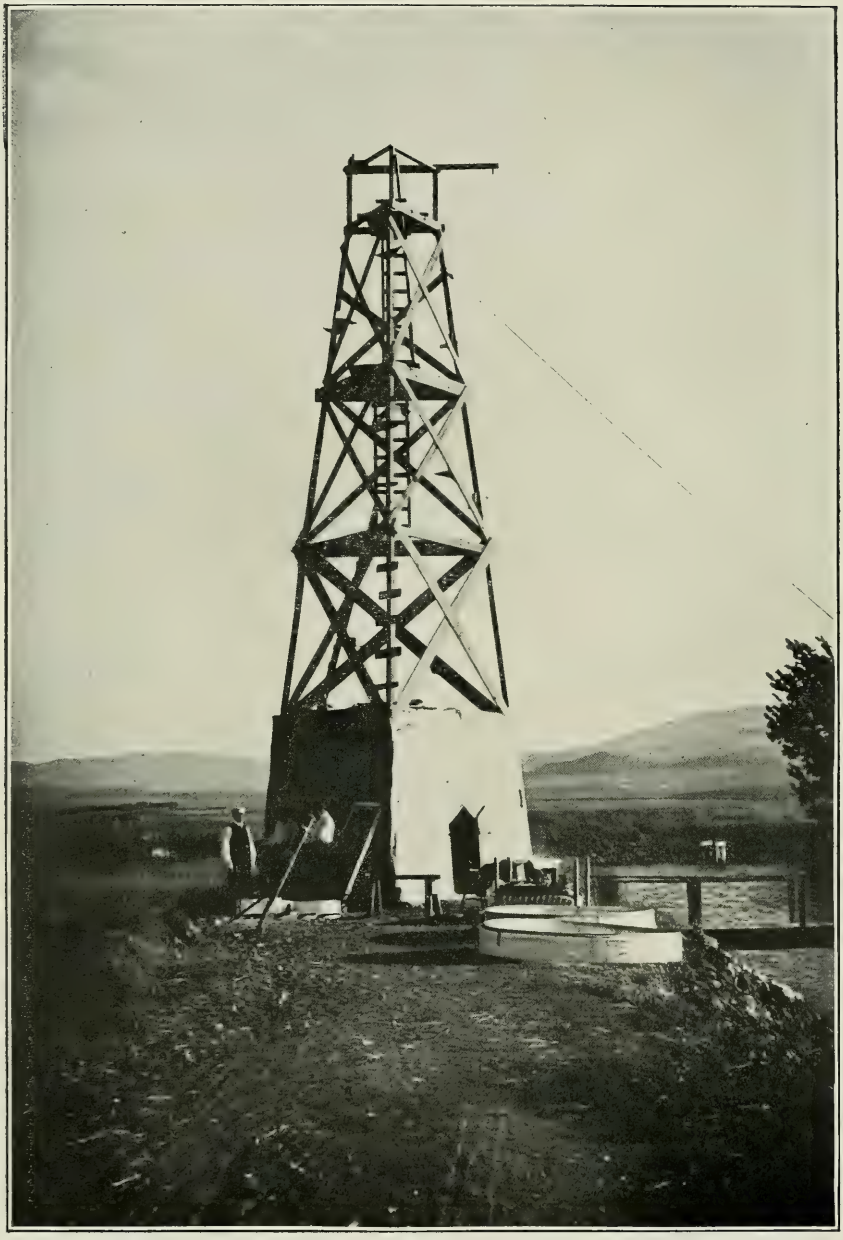


Photo by J. E. Church, Jr.

RENO RESERVOIR, TOWER NO. 2

Showing two six-foot evaporating pans and the landings for four two-foot pans

This fertile soil has attracted large irrigation projects over the Imperial Valley, south of the Sink, where 15,000 to 20,000 people are now engaged in putting 400 square miles of country under irrigation by means of canals from the Colorado River. It was while this canal system was being constructed, with inadequate headgates at the river, in the soluble soil, that in 1905 the headings opened by wearing in the banks and let the entire waters of the river flow down the steep gradients to the north. The Imperial Canal, the Alamo and the New rivers became raging torrents and cut away immense masses of country, which was transported into the Salton Sink. At Brawley the Alamo River was cut down from a shallow channel to a gorge 60 feet deep, and it spread out many hundred feet near the sea; also the New River, which at Brawley is 6 miles west of the Alamo River, now has a bed 800 feet wide and 80 feet deep, whereas it was lately only a shallow stream. The entire system of canals constructed by the California Development Company became disorganized, many towns were injured, and it is estimated that $400,000,000 of property was in jeopardy.

To meet this emergency the Southern Pacific Railroad Company undertook, in connection with the Development Company and the U. S. engineers of the Reclamation Service, to build suitable levees to control the future course of the Colorado River, and in February, 1907, after several disappointing failures, this was finally accomplished. The new levees withstood the floods of June with a stage of about 30 feet, and there is every reason to believe that the Colorado River will be permanently diverted to the southern slopes of its delta instead of to the northern, as was recently its course.

KNOWLEDGE OF THE RATE OF EVAPORATION VERY NECESSARY

The result of this temporary flow of the river to the Salton Sink was to make a lake of fresh water about 45 miles long, 10 to 15 miles wide, containing 440 square miles of water surface, having a depth of 80 feet in the middle.

In May, 1907, the surface of the sea was 205 feet below sea-level, and in October it had fallen to about 207.5 feet. This loss is due to evaporation, but the actual evaporation should be made to include the amount that has been added through the flow of the Alamo and New rivers, which has been quite considerable. During the past year, while the canals were only partially repaired, more water flowed to the sea than will be the case after the beginning of 1908, when operations for irrigation will be fully resumed for that season.

It has been supposed quite generally that as much as 8 feet of the Salton Sea would evaporate annually, though we now have reasons to think it may not be more than 4 or 5 feet, as will be shown from the results of the Reno work. It is evident that, as the sea evaporates, in the course of a few years we shall have a series of lakes of different sizes, and that in general this sea gives us an unusually good opportunity to study the subject of evaporation on a large scale and under favorable conditions. Mr G. K. Gilbert, of the Geological Survey, proposed that the government should take up this subject, because the theory of evaporation in application to bodies of water in the open is very unsatisfactorily understood, as shown by the discordant results of several researches along this line.

The engineers of the irrigation projects require to know how much a given area of water surface will evaporate in a given climate, in order that the dams may be built at an economic height, and that they may know how much water will be available for distribution to farmers. The engineers of water-works systems for large cities, especially in the arid West, need such information in a reliable form as a factor in their estimate of resources. The meteorologists also require the same knowledge to supplement their observations on precipitation. For example, in the United States, east of the Mississippi

River, the precipitation and the evaporation are about equal to each other—40 inches per year; on the Rocky Mountain plateau the precipitation is about 20 inches and the evaporation 60 inches, and in the southwestern states the precipitation is only 10 inches and the evaporation 80 inches. The available water is therefore derived from the melting snows of the mountains, brought under control by the rivers and the canals to the fertile soils of the arid regions, and this means the construction of storage basins, which are subjected to intense evaporation.

Mr Gilbert's suggestion resulted in a conference board from the U. S. Geological Survey, the U. S. Reclamation Service, and the U. S. Weather Bureau visiting the Salton Sea and reporting that the project of studying the laws of evaporation at the sea should be undertaken, and that the work should be under the immediate control of the U. S. Weather Bureau.

There have been several important and careful researches made regarding the probable law of evaporation from small pans, with the view of connecting the amount of water delivered by a pan to that given off by a lake or large body of water in the same climatic conditions. It is much to be desired that the law shall so be expressed that from the given meteorological data of a locality the corresponding amount of the loss of water in a basin of any size can be computed. Unfortunately the results of these researches are by no means in agreement.

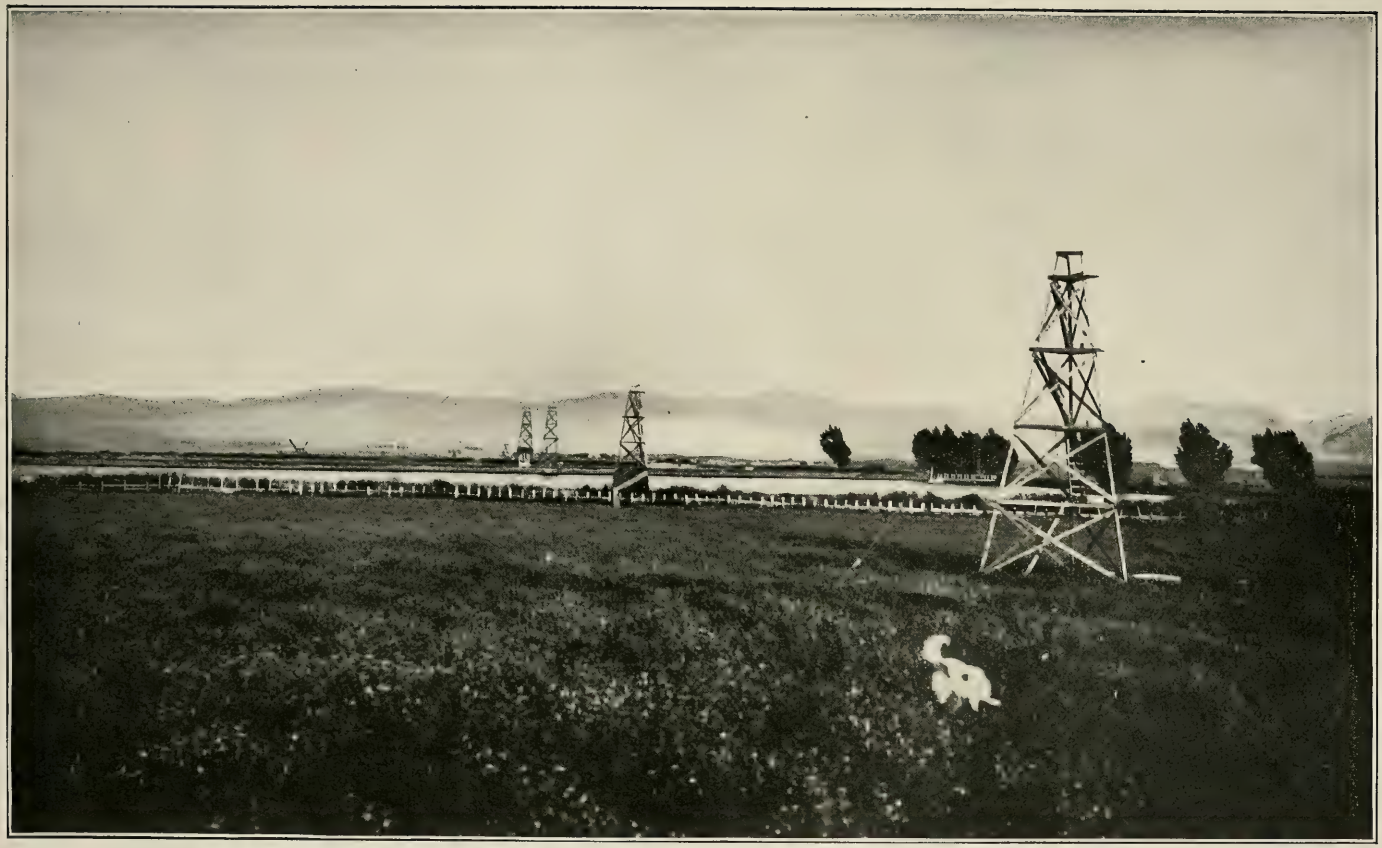
In view of the fact that an expensive campaign is being planned at the Salton Sea, to extend over several years, it seemed prudent to attempt to gain some better ideas regarding the physical problems involved before beginning the work in the desert.

THE STATION AT RENO, NEVADA

After consideration it was decided to set up at Reno, Nevada, a temporary experiment station, planned to bring out the causes of the disagreements. In summer the dryness of the climate at Reno is about the same as at the Salton Sea, and the amount of evaporation from a small pan is nearly the same in amount, nearly 8 feet per year; but the discomfort of working in the open is not nearly so great, on account of its elevation, 4,500 feet above sea-level. Our experience showed us that Reno possesses an unusually agreeable summer climate, with cool nights, not very hot days, and plenty of wind from the mountains to keep up a very pleasant circulation of the air, especially in the afternoons.

We set up five towers, 40 feet high, by August 1, 1907, and continued regular observations till September 15, by which time we had secured all the records needed for our preliminary studies, some 35,000 observations, including 100,000 readings of our instruments. There were 29 evaporating pans placed in position, five 6-foot pans in the water or on the ground near the base of the towers, and twenty-four 2-foot pans on the stagings above the surface. The records were taken every 3 hours during the day, from 5 a. m. to 8 p. m., and readings were made at 1 o'clock, just after midnight. These included the temperatures of the water surface, of the air at half an inch above the water, and of the air at two feet above the water of each pan. The vapor tensions, dew-points, and the amount of water evaporated were also on the program. The wind velocity at different heights, from the bottom to the top of the towers, was observed, and some new Pische evaporimeters were employed, with the purpose of ultimately substituting them for the large evaporation pans.

The serious trouble with all this class of meteorological work is that there is no suitable self-registering apparatus for recording the wet-bulb thermometers or of getting the vapor contents of the air continuously. The consequence is that we must read the instruments many times daily, in order to obtain any correct knowledge of the variations of all these elements with the heating and cooling of the atmosphere in the course of the day,



THE FIVE TOWERS USED IN THE EVAPORATION EXPERIMENTS, RENO RESERVOIR

The pans may be discerned in the tower on the right. No. 1 is the distant tower and No. 5 the nearest tower, situated in an alfalfa field. The maximum evaporation was at the top of the towers in the lake, but was just as rapid at the bottom of tower No. 1 in a dry field and nearly as vigorous within 10 feet of the ground at tower No. 5 in the alfalfa field.

and at present there is no way to avoid this labor and expense. The physical exertion of climbing towers, carrying a basket of instruments along, making readings all day, was not inconsiderable, as it took from forty minutes to one hour to do the work on a single tower. There were five towers to attend to, and this had to be repeated seven times every day. We had the good fortune to incur no accidents of a personal nature, though several thermometers were broken in the operations.

The wind during the afternoon and evening often reached 40 miles an hour, and even 50 miles per hour, and on the top of the towers it was no little task to guard the delicate instruments against injury in the violent gusts. The Sierra Nevada mountains, 10,000 to 12,000 feet high, poured down into the Reno Valley a powerful current of cool air every day with wonderful regularity, and this caused the strong winds to prevail.

INTERESTING RESULTS

We succeeded in keeping up the current reductions of the observations to an advanced stage, and so gained an idea of our results before leaving Reno, the 18th of September. They were such as to show clearly enough the source of the discrepancies that have been mentioned. For example, it was soon seen that the evaporation from the pans on the top of the towers was from two to three times as much as at the foot of the towers, in or near the water, and that there is a regular progression from pan to pan. On the other hand, in the dry field where tower No. 1 was located there is no such important difference, the evaporation being practically the same all the way up the tower. At tower No. 5, in the alfalfa field, where the ground was wet from irrigation, we found that the retardation of evaporation was confined to 10 or 15 feet from the ground.

It became clear enough that the reservoir, which is about 1,000 feet long, covers itself with a sheet of invisible vapor about 30 feet thick, and that this vapor acts like a blanket upon the fresh evaporation rising from the water. During the process of evaporation there are two principal stages: First, the water must turn into vapor, and the amount differs according to the temperature. Thus, for 0° centigrade 1 cubic centimeter becomes 211,000 cubic centimeters of vapor; at 100° centigrade it becomes 1,658 cubic centimeters of vapor. Second, these columns of fresh vapor must stream off into the air by diffusion and mixture, and the capacity of the air to receive it depends upon its own temperature and dew-point, which determine its vapor contents. If the air is dry and the difference between the dry-air temperature and dew-point is great, there will be rapid evaporation, but if small the evaporation will be slow. The wind is an important factor, because it brings new masses of air, not so much saturated, over the water surface, and thus keeps the superposed air more ready to receive the newly evaporated vapor. There are at least five factors to take into the account:

1. The diffusion factor—a function of the height above the surface of the water.

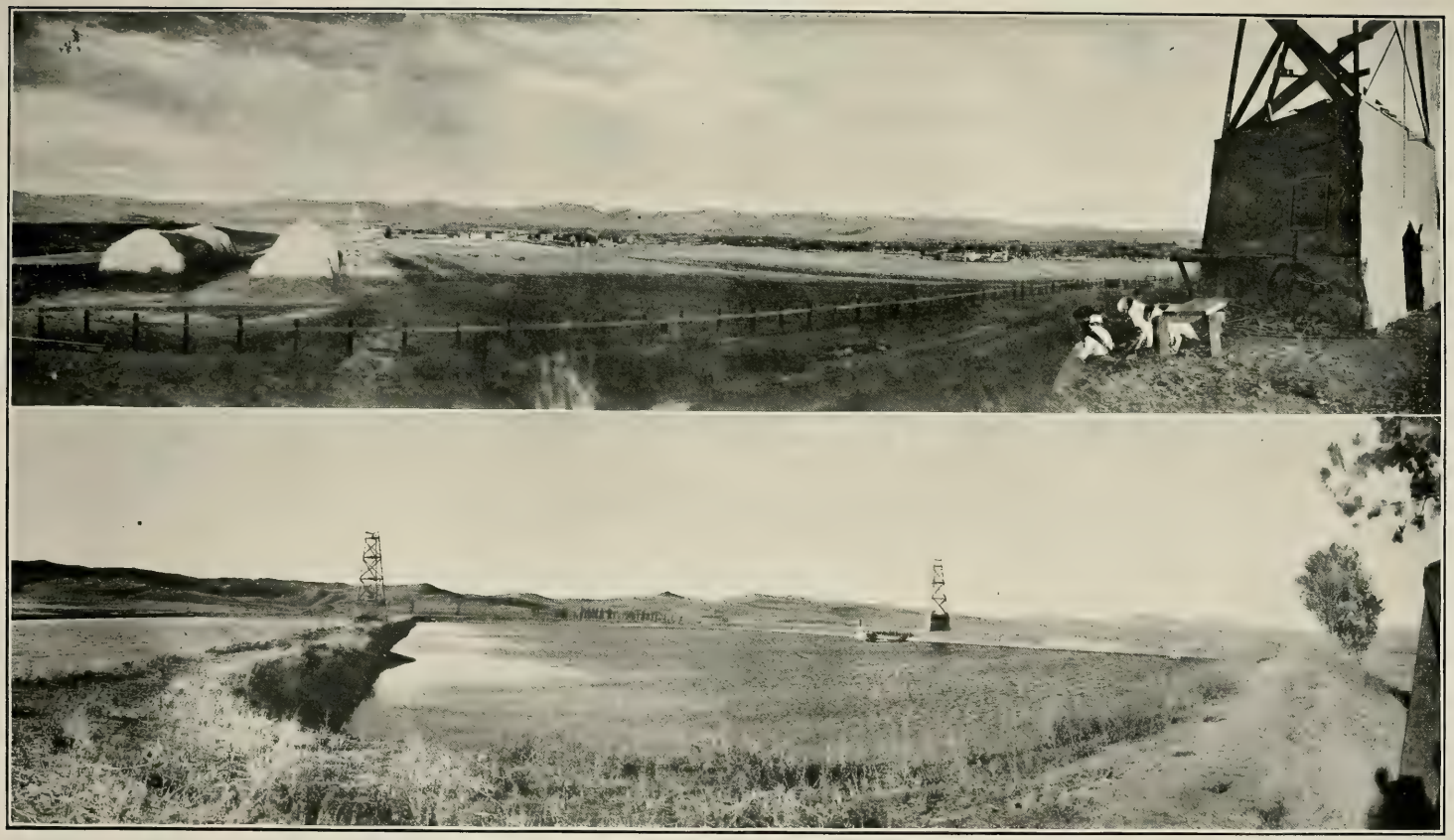
2. The temperature of the water and its capacity to deliver vapor—a function of its vapor pressure.

3. The capacity of the air to receive vapor—a function of the difference between the dry air temperature and the dew-point.

4. The velocity of the wind, the function being the square of the velocity.

5. The wind coefficient, being a function of the height above the ground.

A small pan in the open air, away from a sheet of water, evaporates faster than the same pan in like conditions located within the blanket of vapor lying over a lake, because these factors operate together differently. Hence it is evident that the location of the experimental pan relative to the water surface of a lake must be fully taken into the account. The many pans at Reno gave differing results, grading up and down the towers, and from the center of the reservoir to the distant dry fields, in such a way as



SCENES NEAR RENO, AND THE EXPERIMENTAL TOWERS

The city of Reno is seen from the reservoir on the right; the University of the State of Nevada in the middle, and the town of Sparks in the distance, near tower No. 1; hay ricks from irrigated fields, the water coming from the Truckee River and Lake Tahoe, in the Sierra Nevada Mountains.

The double reservoir. The evaporation was more than twice as rapid at the upper pans as at the water surface. This is due to a blanket of vapor about 30 feet thick which retards the evaporation in the layers of air near the water. In this way nature conserves its waters from too rapid loss by evaporation. Photos by J. E. Church, Jr.

to leave no question of these facts. Previous researches have not taken sufficient account of the locality of the small pans in deriving their formulas, and they have been discordant as a consequence.

The preliminary discussions of the data, made since our return to Washington, show that we must depart from the common Dalton Law in at least four important particulars, and we shall proceed to test the new formula as fully as possible within the next few years.

It is our purpose to erect two or three towers at the Salton Sea, one high tower on a small island about four miles from the southern edge of the sea, to get some idea of the behavior of the great vapor blanket lying over that large water area. We must know its depth and how it acts over a large body of water, as compared with the small Reno reservoir. There will be two smaller towers in the sea, one about one mile from the Salt Creek trestle and projecting 20 feet from the surface, and another in 50 feet of water and flush with the surface. As the waters recede under evaporation, in a few years these sea towers will gradually become land towers, and this will enable us to study the working of the blanket from the middle of the sea into the country—that is, for large and for small lakes—in the course of a few years. It is purposed to invent, if possible, suitable apparatus for self-registering the evaporation and for recording the vapor contents of the atmosphere.

There are, however, numerous and serious difficulties to be overcome in the carrying on the work at the Salton Sea, and not the least is the hardship of enduring the high temperatures of the summer as well as the loneliness of the isolated life that must be experienced by the observers. The officials of the Southern Pacific Railroad—Mr R. H. Ingram, the general superintendent of the Southern California division, and Mr A. D'Heur, the chief engineer—have courteously agreed to coöperate with the U. S. Weather Bureau in the construction and maintenance of the piers, towers, and houses needed for the investigations.

I was assisted at Reno, Nevada, by Mr H. L. Heiskell of Washington, D. C., Mr Geren, Mr Robeson of Reno, Professors Minor and Church of the University, by Messrs Pearson, Steffin, Beebe, Potthoff, students, and by many citizens of the city of Reno, to all of whom the Weather Bureau is greatly indebted.

METHODS OF OBTAINING SALT IN COSTA RICA

THE following series of illustrations, showing the methods of obtaining salt on the Pacific coast of Costa Rica, were taken by Professor Y. Fid Tristan of San José. Professor Tristan is a member of the National Geographic Society who lives in Central America, and sends the pictures to its Magazine that all the members of the Society may see this quaint method of getting salt.

There are only a few miles of railway in Costa Rica. Transportation is therefore expensive, but labor is cheap. While the salt obtained in this primitive manner is coarse, it answers most of the requirements of the people. Costa Rica is one of the most interesting sections of the Americas. The proportion of its white population is large for a Latin American country. Public instruction is free and compulsory and the Costa Ricans are among the most cultured of the American peoples.

OBTAINING SALT AT CALDERA, COSTA RICA

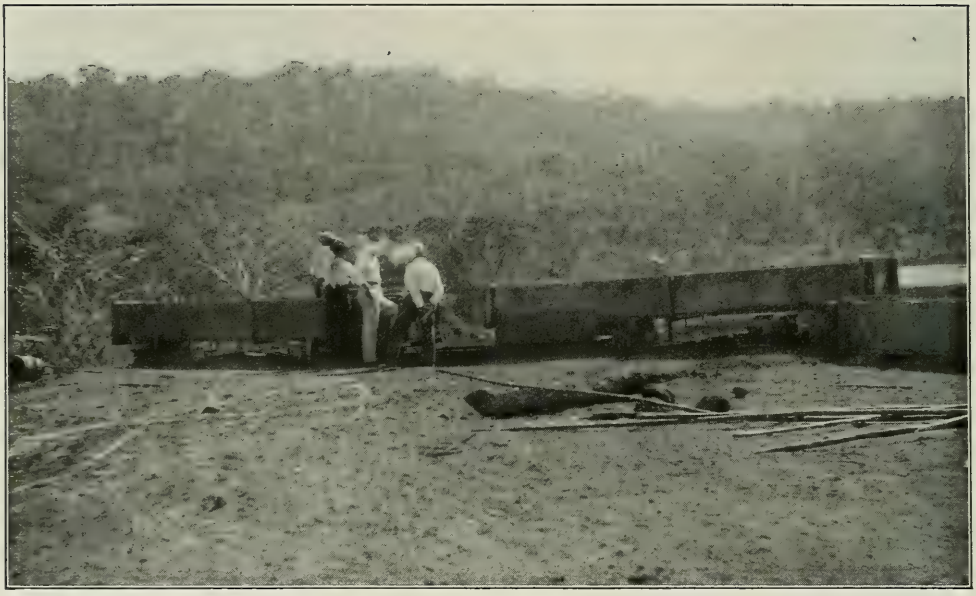
The places in which salt is made are low and flat lands which are flooded at high tide. After withdrawal of the water, when the soil is left dry, a queer implement which looks like an enormous wooden comb drawn by oxen is dragged over the whole patch of land. Photos by Prof. Y. Fid Tristan.

PROVIDED WITH WOODEN SPADES THE PEONES GATHER THE SALTED EARTH INTO LONG, NARROW HEAPS

THE HEAPS THUS MADE AND THE LOW WATER AT THE DISTANCE

COLLECTING THE SALTED EARTH

While the oxen are slowly progressing the *peones* rapidly load into the carts the salted earth. The contents of all carts are unloaded so as to make a single heap



FILTERING OUT THE SALT

The salted earth is unloaded into two wooden tanks, in the bottom of which a layer of straw and sand has been placed. Salt water is poured over the earth and filters through the straw and sand. The saturated water is collected into another tank buried under those which are in sight. To ascertain the density of the solution a new laid egg is introduced into it. The operation is concluded when the primitive areometer is nearly but not completely submerged.

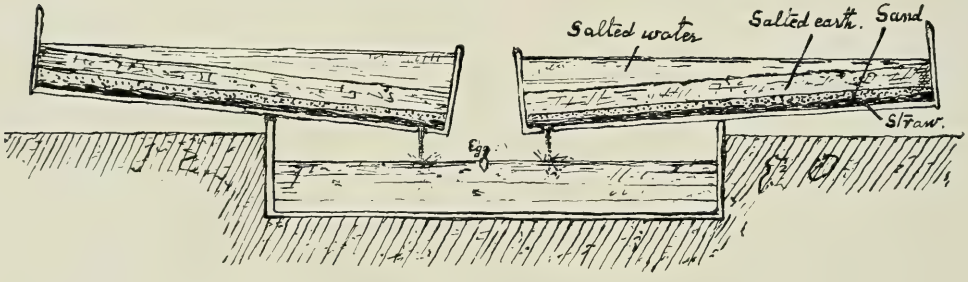


DIAGRAM TO EXPLAIN THE FILTER TANKS

VAPORIZING THE SALT SOLUTION

The saturated solution is brought to the vaporating pans where it is converted into a solid mass of impure salt. This is heaped into a large deposit. Wooden dishes are used to carry the salt from the pan to the heap

WEATHERING THE SALT

Here the tropical climate takes a share in the operation. Owing to the dampness of air the various delinquescent salts, which are found together with table salt in sea water, are dissolved and run out in a stream from the heap. The salt always remains impure. Photos by Prof. Y. Fid Tristan.

DR BELL'S MAN-LIFTING KITE

THROUGH the courtesy of Dr Alexander Graham Bell, the NATIONAL GEOGRAPHIC MAGAZINE is enabled to print the following series of illustrations of his experiments with his gigantic man-lifting kite, the Cygnet. This kite was sent up in December, 1907, both with and without a man. The pictures on pages 42-44 show it aloft, carrying no weight, while those on pages 49-52 illustrate the flight when Lieutenant Selfridge, of the United States Army, ascended to a height of 168 feet and remained in the air for over seven minutes.

While Dr Bell's ultimate object is to secure a flying machine that will support itself in the air at a moderate rate of speed,* the experiments with the Cygnet have been mainly studies in stability. The wonderful steadiness of this form of structure is shown by the pictures and especially by the fact that the Cygnet descended from 168 feet to the water so slowly and evenly that the man aboard did not realize he was dropping until he found the kite in the water. The kite flew as easily with Lieutenant Selfridge aboard as it had on the previous trial with no load, and could undoubtedly have borne a weight several times as great as that of one man. Owing to the severity of the winter in Baddeck, Cape Breton, Nova Scotia, where these experiments are being conducted, it has been necessary to postpone further flights until the spring, when the work will be resumed.

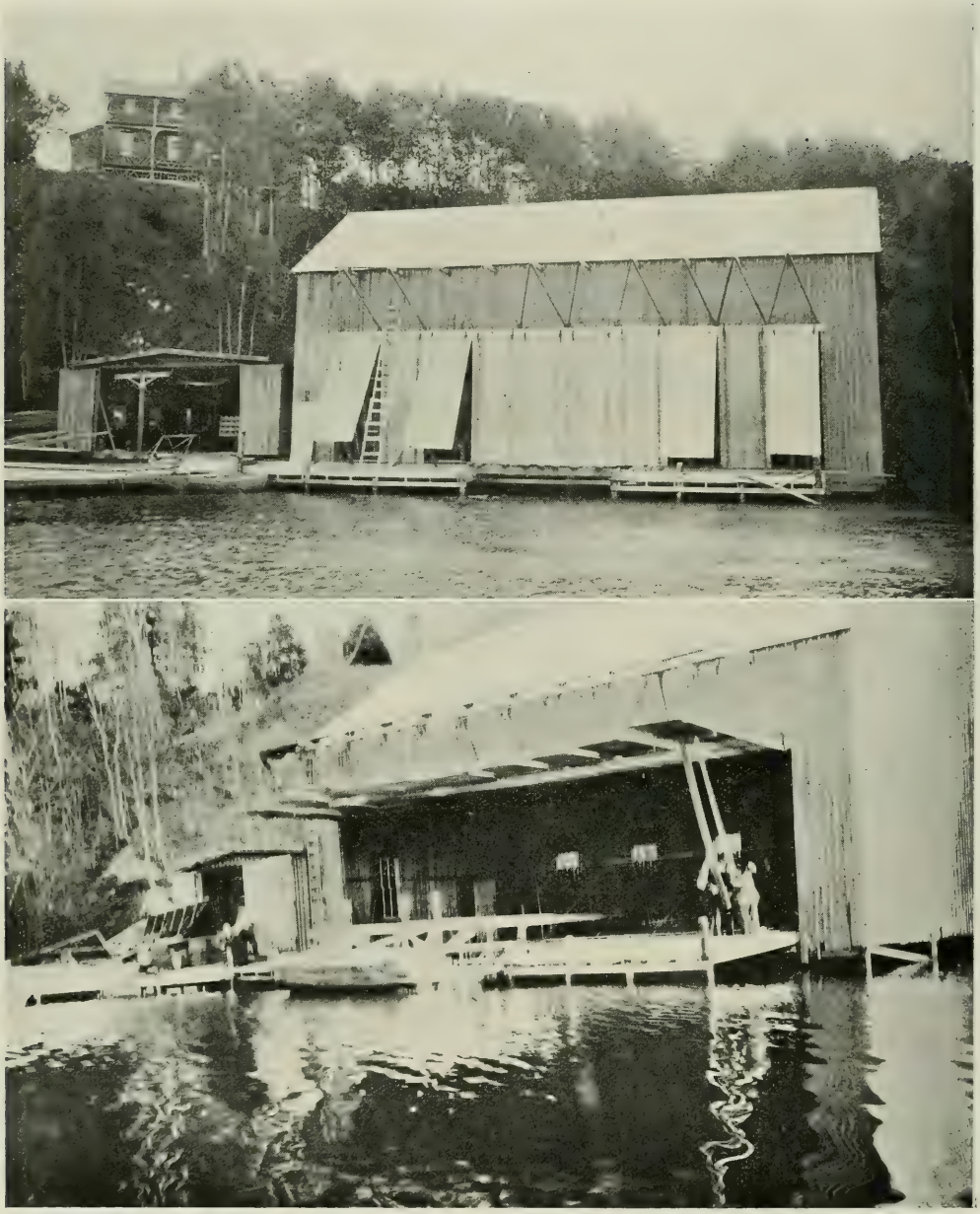
Dr Bell's next step will be to put a powerful light motor on a modified form of the Cygnet.

The photographs were taken by Mr J. A. Douglas McCurdy.

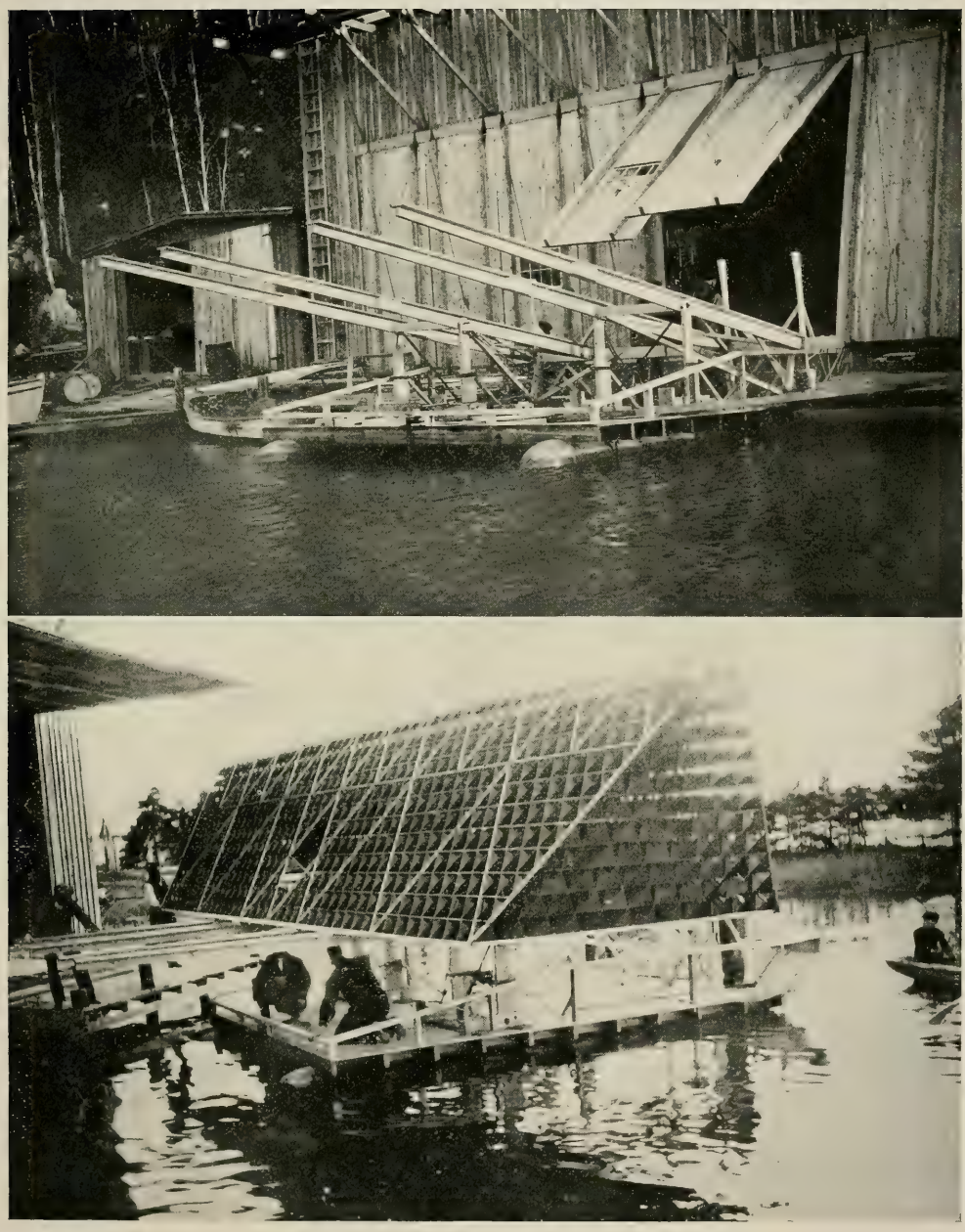
* See "Aërial Locomotion, with a few notes of progress in the construction of the Aërodrome." By Dr Alexander Graham Bell, NATIONAL GEOGRAPHIC MAGAZINE, January, 1907.

PRACTICE DRILL WITH A SMALL KITE

The water shield in the bow keeps the men comparatively dry



VIEWS OF THE AERODROME SHED IN WHICH THE GIANT MAN-LIFTING KITE, THE CYGNET, IS HOUSED

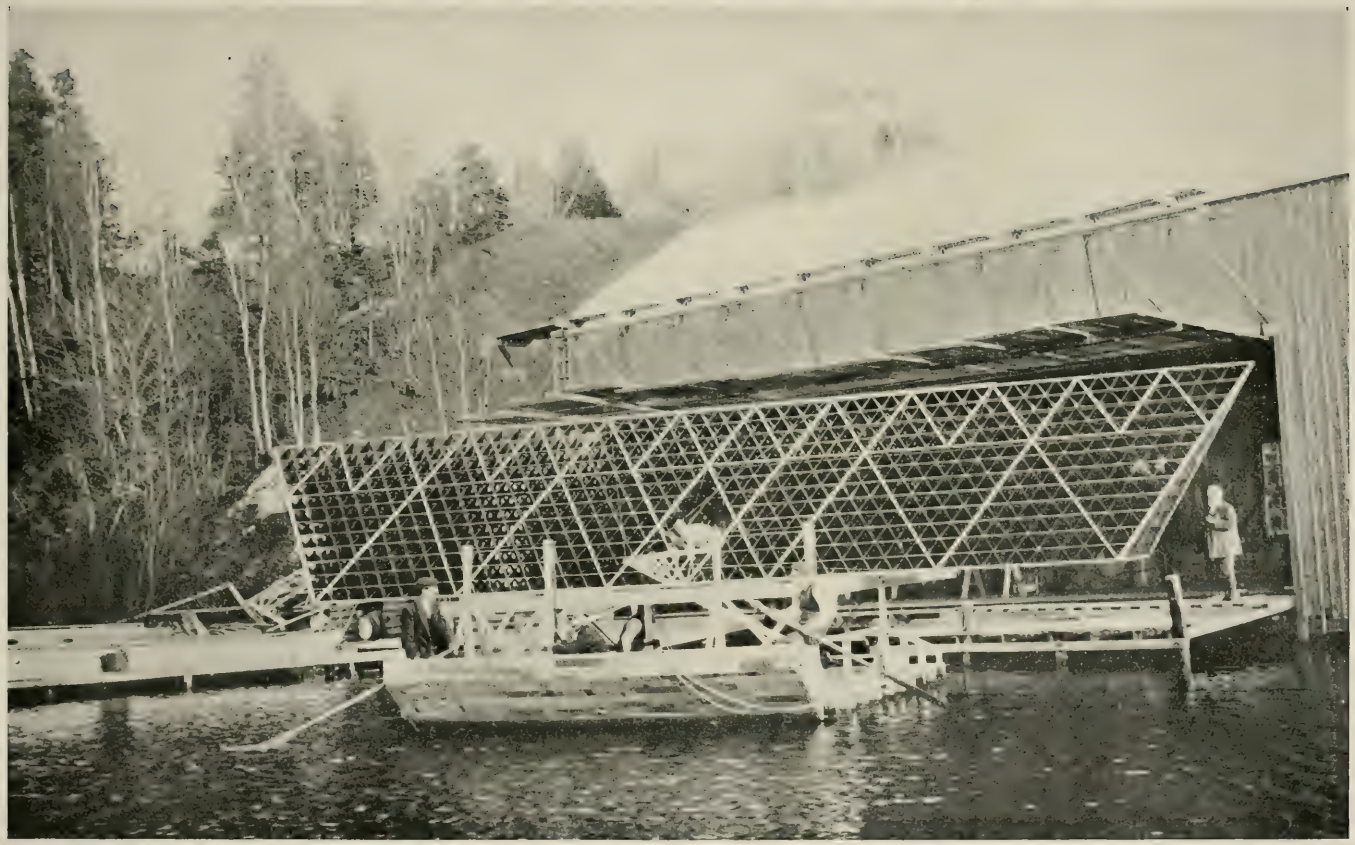


VIEW OF THE AERODROME SHED

Showing the raft with its long tilting arms backed up against the building to receive the giant kite. The Cygnet placed on board the raft

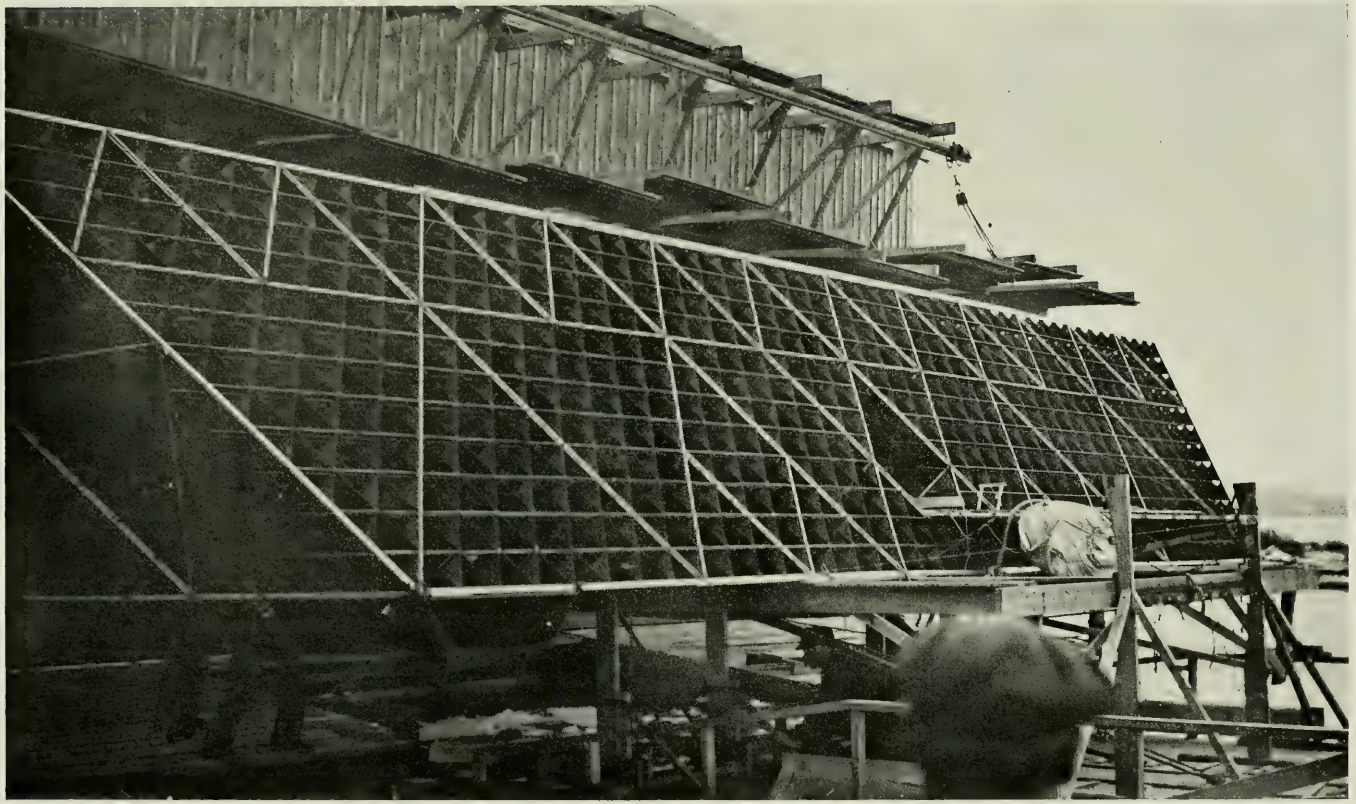
MEMBERS OF THE AERIAL EXPERIMENT ASSOCIATION

Beginning on the left, G. H. Curtiss, of Hammondsport; F. W. Baldwin, C. E., of Toronto; Dr Alexander Graham Bell; Lieutenant Thomas Selfridge, U. S. A., and John A. D. McCurdy, C. E.



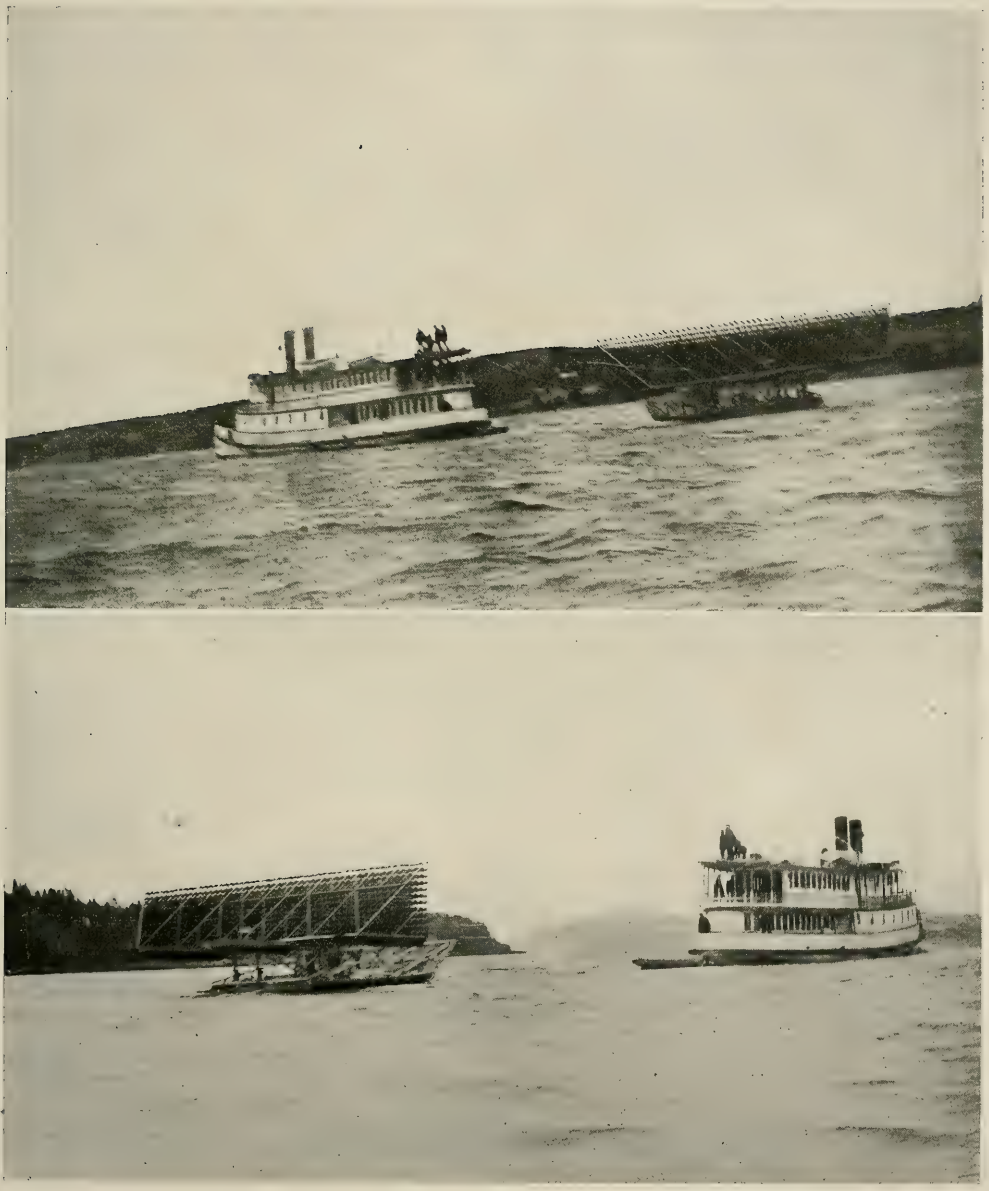
FRONT VIEW OF THE CYGNET, SHOWING THE MANHOLE IN THE CENTER

The dimensions of the kite are: 13 meters from side to side on the top, and 10 meters on the bottom; oblique height, 3 meters; depth from fore to aft at the bottom, 3 meters



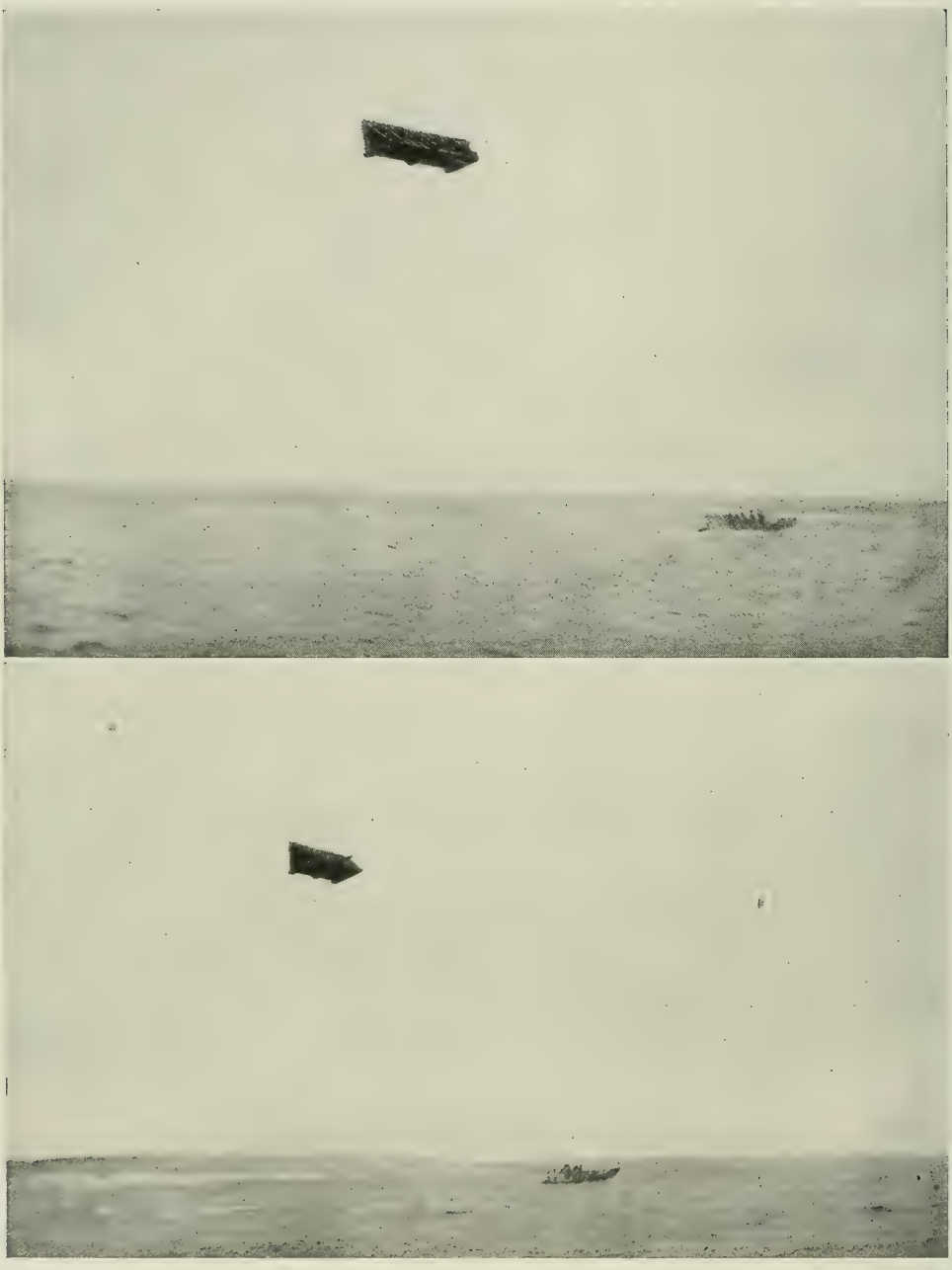
ANOTHER VIEW OF THE GIANT "CYGNET"

The kite proper weighed 85.032 kilograms, and the floats 9.400 kilograms; total, 94.432 kilograms (208 pounds). Flying weight, 510 grams per square meter (oblique). The kite is composed of 3,393 winged cells, having a surface of 183.6461 square meters. The bow was covered below with silk, presenting the same dihedral angle as the cells equivalent to 1 meter. In addition to this the bottoms of the floats gave a horizontal surface of 8 meters, but as the floats undoubtedly blanketed the lowest tiers of cells above them the floats may be counted as dead load, and the whole surface considered as equivalent to 185 meters oblique. The white bag in center is the sea anchor which, when the kite takes the water, keeps the kite headed to the wind. (See page 45.)



TOWING THE GIANT KITE, PREPARATORY TO SENDING IT ALOFT

When everything is ready for the release, the tilting arms of the raft (see picture, p. 37) are raised, and the kite let go

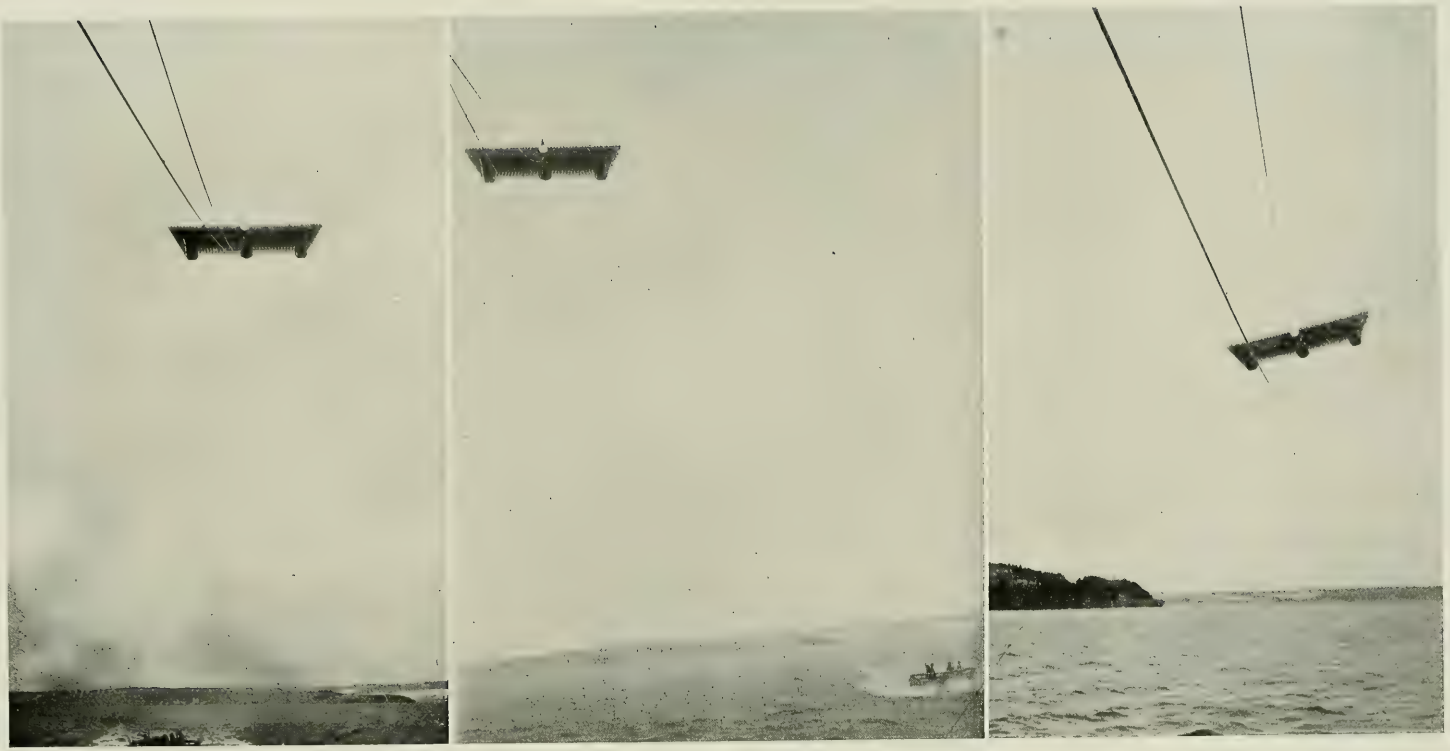


VIEWS OF THE KITE IN THE AIR

Flying in a 30-mile wind. The remarkable stability of the tetrahedral structure in air is illustrated by the pictures. For flying weight see p. 40

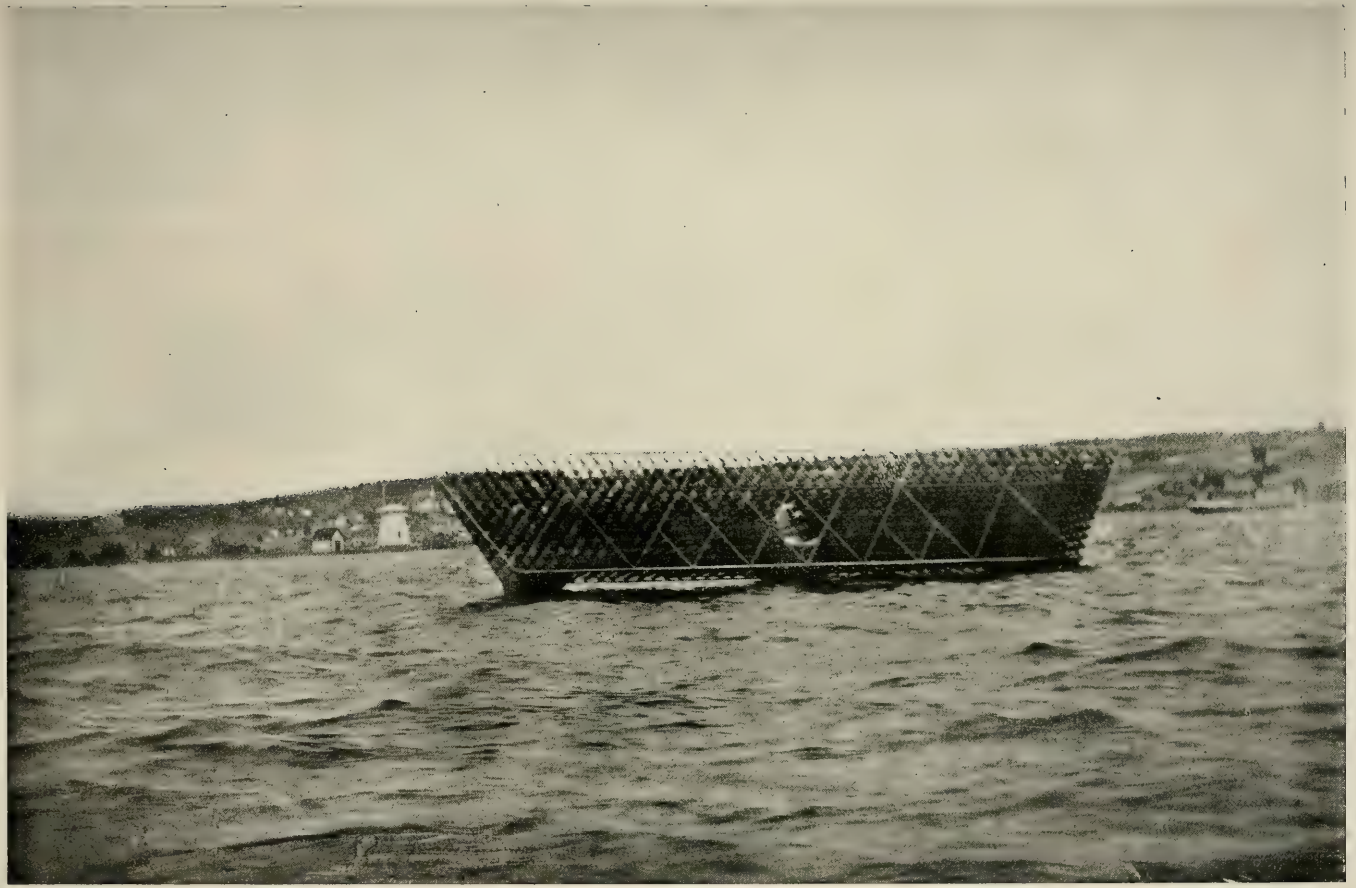
ANOTHER VIEW OF THE KITE ALOFT

The pull on the flying line was greater than could be measured, but considerably exceeded 210 pounds



VIEWS OF CYGNET IN AIR

1 and 2. Sending the kite up; bowline slack, flying line tight. 3. Bringing the kite down; bowline tight, flying line slack. The white dot seen on the kite is the sea anchor



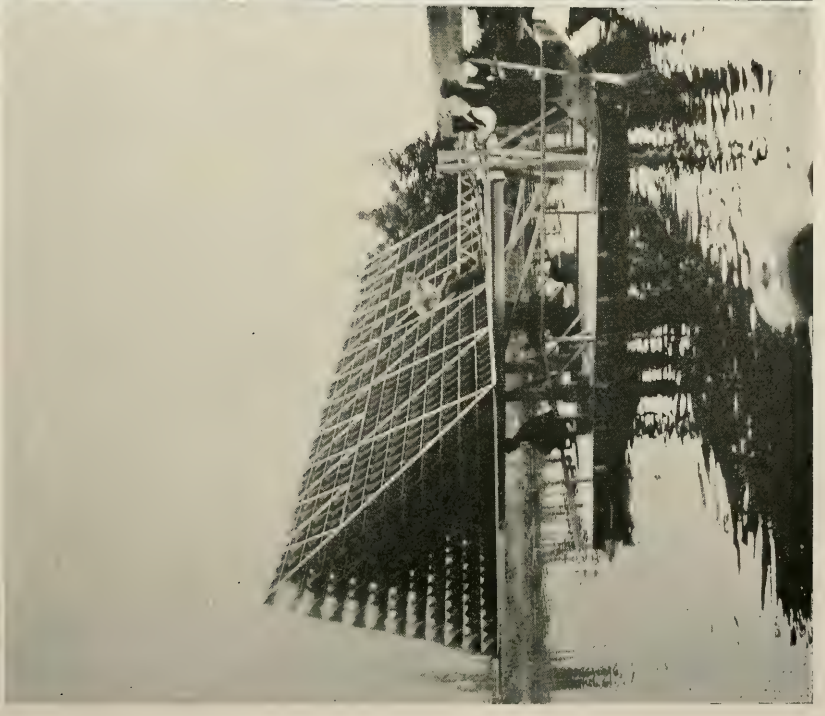
AFTER THE DESCENT—FLOATING ON THE WATER, WAITING TO BE PICKED UP

No effort was made, on the first flight of this kite, to land it on the raft when it descended. Both flying line and bowline were let go and the kite allowed to take care of itself. After release the drag of the lines in the water kept the kite flying at an elevation of about 20 feet above the water. The kite drifted in this way for more than a minute and a half, coming down very slowly and gently until she rested on the surface of the water. The sea anchor (see p. 40) took the water well and held the kite in position, facing the wind, until rescued by a row boat.

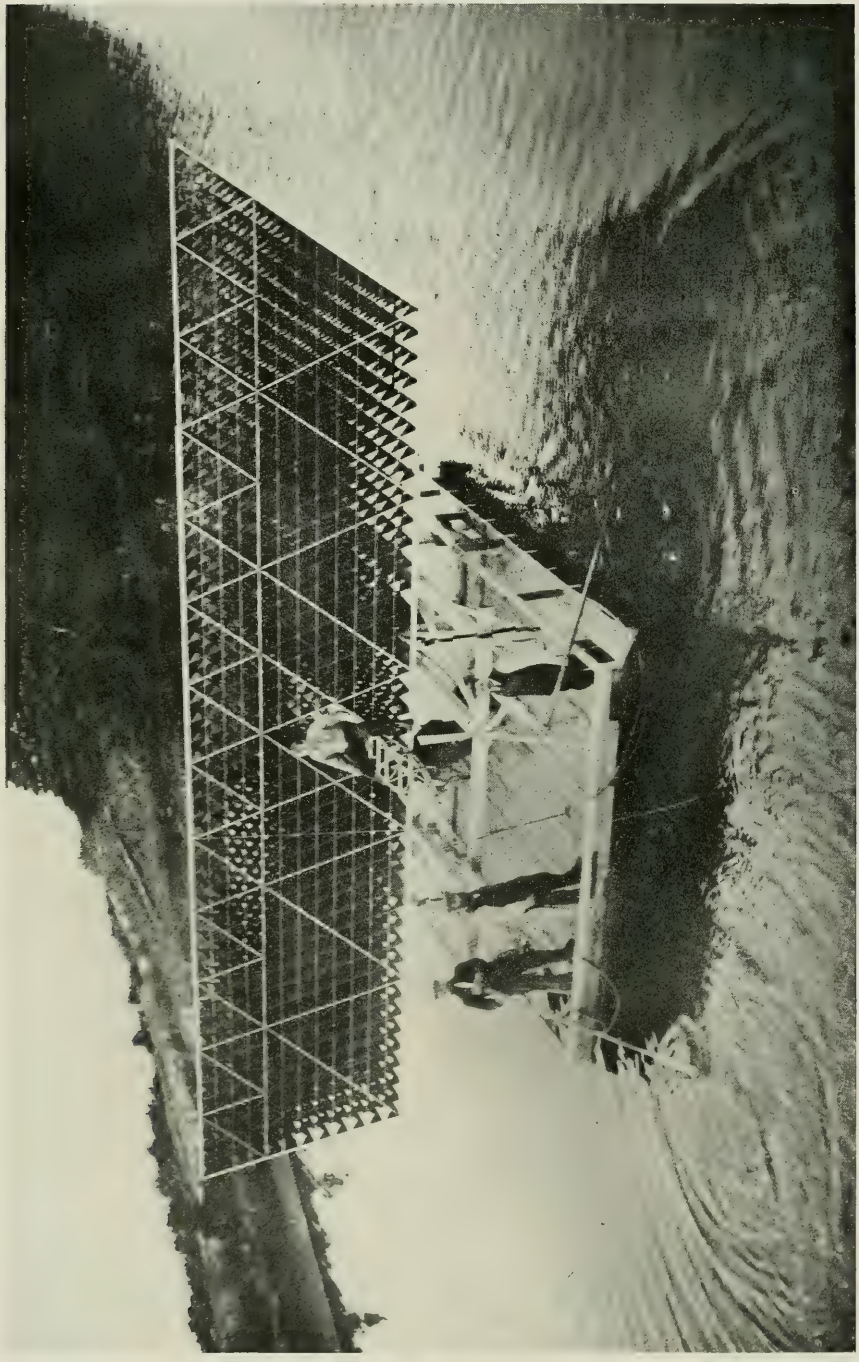
PICKING UP THE CYGNET

THE CYGNET SAFELY LIFTED ON TO ITS RAFT AND READY TO BE TOWED HOME

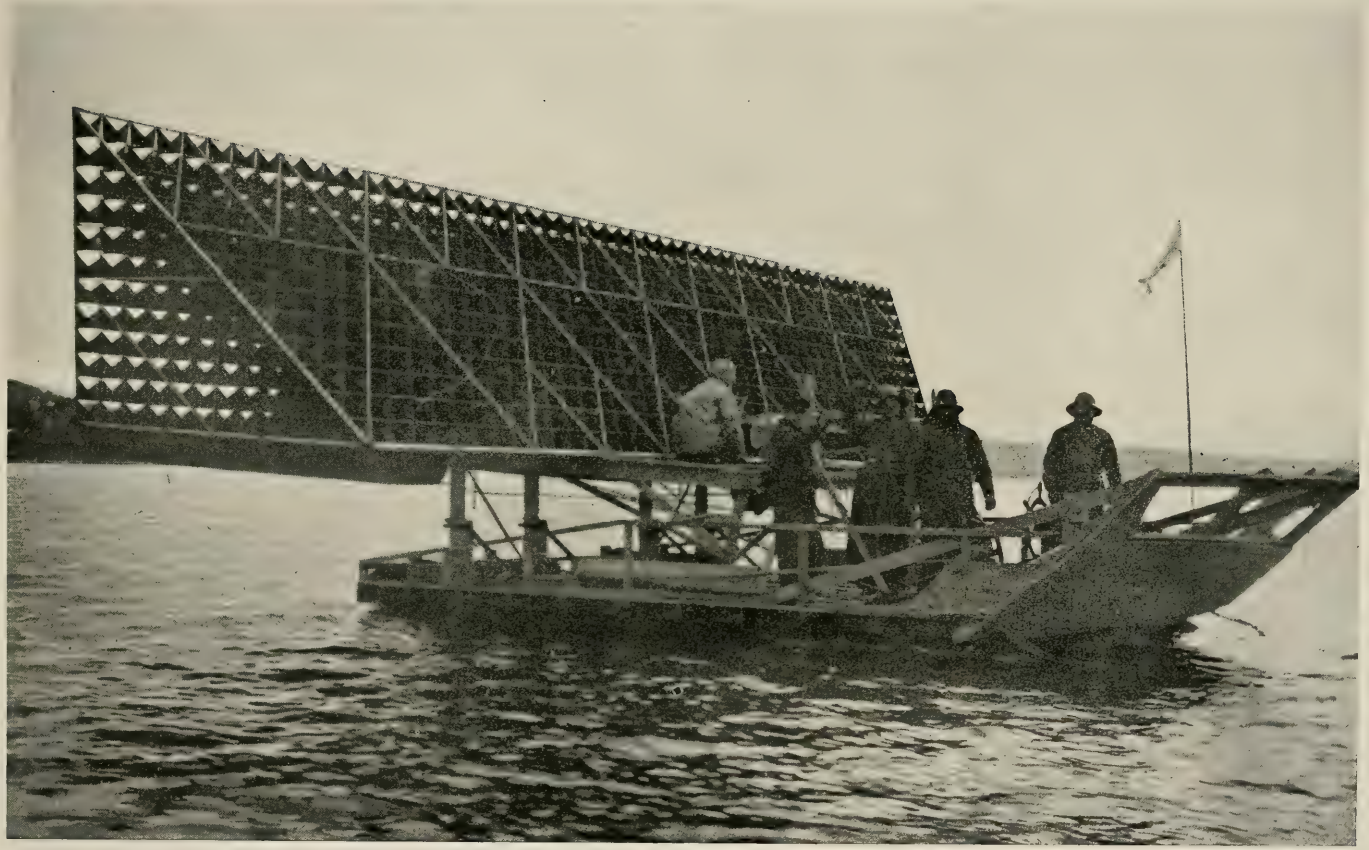
THE MANHOLE



END VIEW OF THE CYGNET

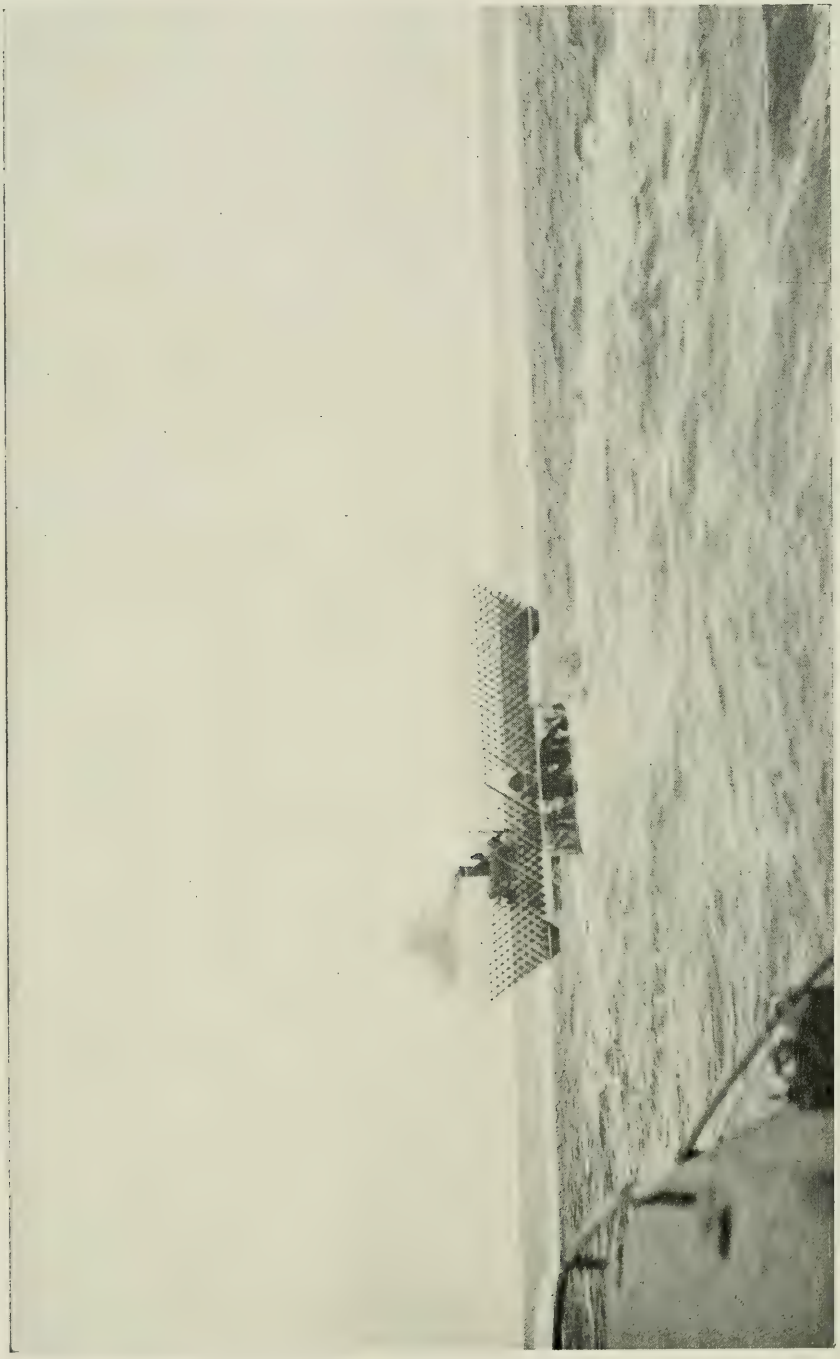


ANOTHER VIEW OF THE CYGNET, SHOWING THE MANHOLE

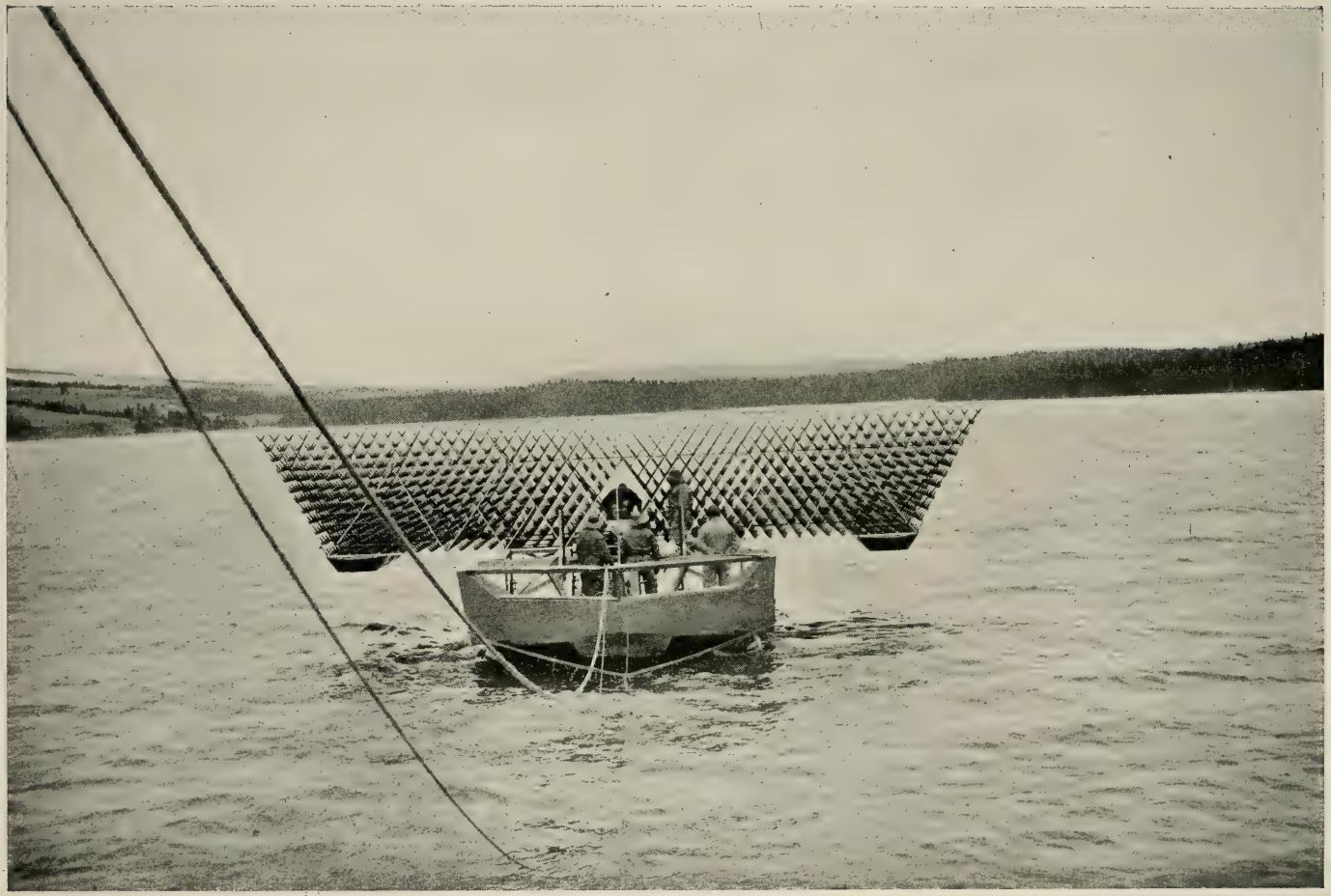


FRONT VIEW OF THE RAFT AND KITE

The high shield at the bow of the raft protects the crew from being deluged by water when the raft is towed rapidly. See picture on page 35



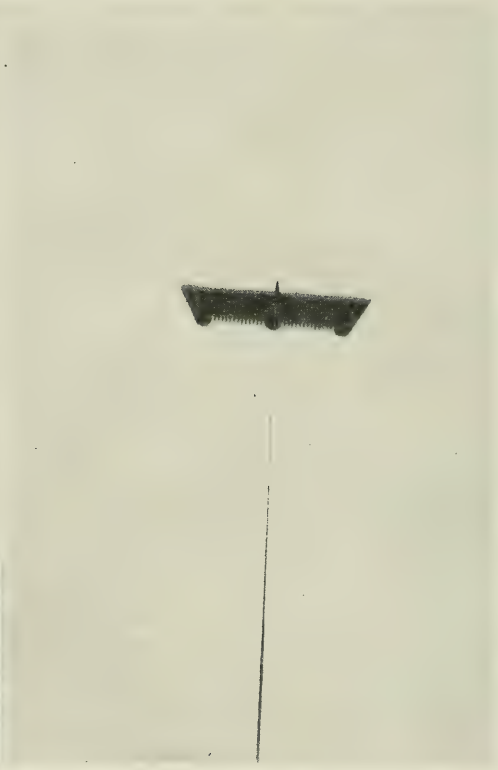
TOWING THE KITE, WITH LIEUTENANT SELFRIDGE ABOARD



ALREADY FOR THE ASCENT

Lieutenant Selfridge can be seen lying down in the manhole. He lay on his face on the ladder floor that had been provided, covered up with rugs to keep him warm, for he was lightly clad in oil-skins and long, woolen overstockings without boots

JUST BEFORE THE ASCENT



KITE WITH MAN ABOARD, FLYING AT A HEIGHT OF 168 FEET

The kite remained in the air for about seven minutes, and then began to come down on account of a decrease in the velocity of the wind. Its descent was so gentle and even that Lieutenant Selfridge, whose view of the water in front was intercepted, did not know it was dropping until it actually touched the water. Photos by Mr John Davidson.

MORE CHANGES OF THE COLORADO RIVER

THE completion of the works at the intake below Yuma early in February, 1907, sent the main current of the Colorado River down the old channel, which it had left empty during the greater part of the previous year. This channel lies near the eastern margin of the delta, and actually cuts into the gravel bluffs of the Sonoran mesa at three places below the international boundary.

The lowest point at which the river finally left this mesa, at about 32° 11′ North, is the center of interest of the present note, for it marks the head of tidal action, and also the location of a depression in the eastern bank from which a shallow trough extended southeastwardly to the shores of the Gulf east of Montague Island. Ordinarily a series of salt pools extend from within two miles of the river down the depression to the Gulf, being known as the Santa Clara Slough.

During a visit to this region in March, 1905, a great volume of flood water was seen to be leaving the main channel and making its way to the Gulf through the Santa Clara Slough, and the prediction was hazarded that a shift of the cutting

action of the water might send the principal current to the sea in this way.*

Shortly after that observation was made the entire stream was diverted into the Salton basin for a time, leaving the bed of the river bare for more than a hundred miles. With the restoration of recent conditions the Colorado resumed its way to the Gulf, but in the mean time such erosion and formation of bars had taken place in the section affected by the tides below the "Colony" mesa that the main current flowed through the Santa Clara Slough, if reports from three different sources are to be credited.

The consequences of this change are somewhat momentous. The main mouth of the river was formerly 20 or 30 miles farther northwest of the new debouchure, and with the converging shores of the Gulf gave conditions which, with the spring tides at from 30 to 40 feet, produced a marked bore, being felt many miles upstream, both in the Colorado and the Hardy. The new channel reaches sealevel by a much more gradual descent and without the strong current and converging shores favorable to developing the bore.

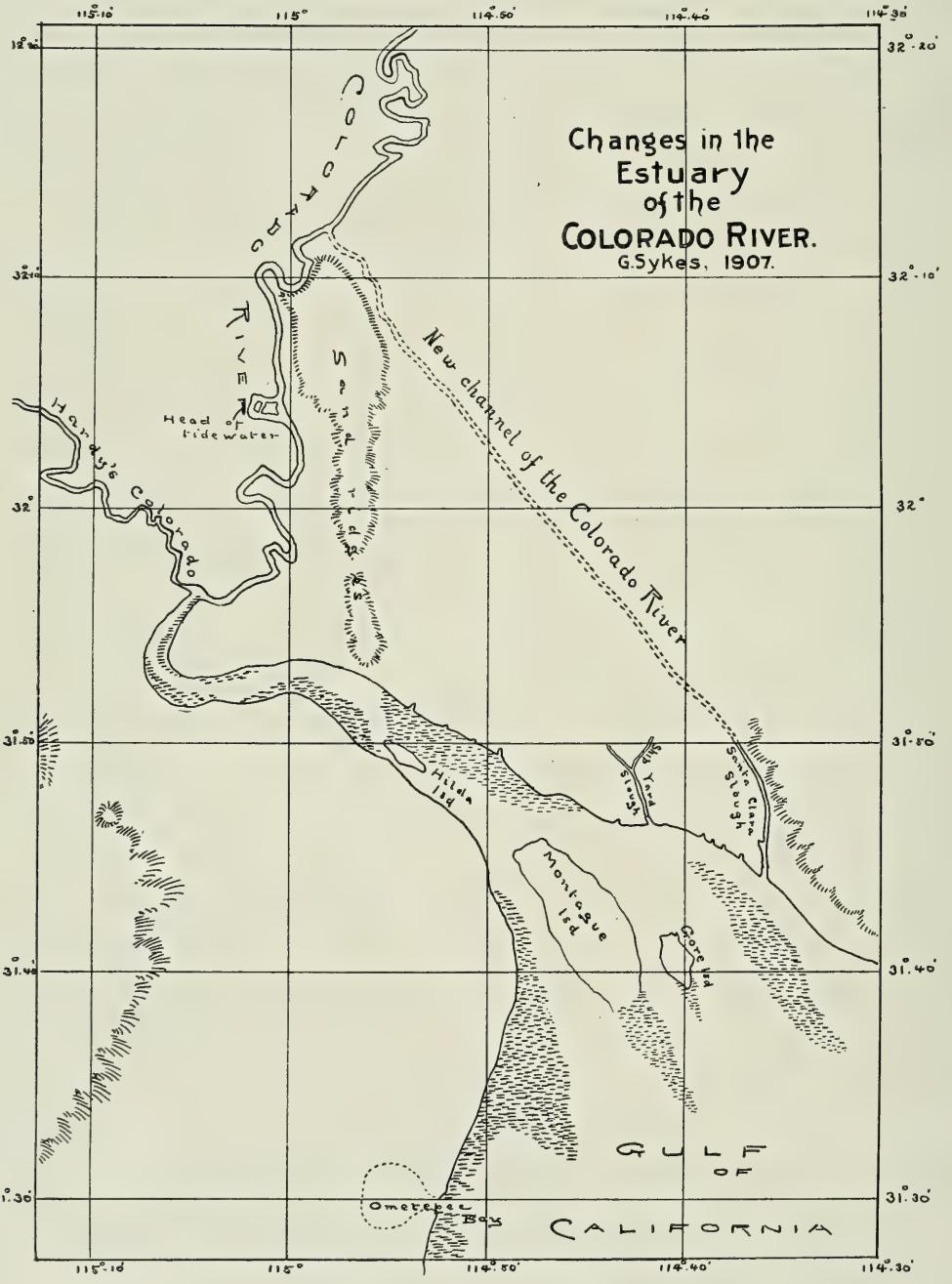
The new mouth will become the center of a new series of mud flats, which fringe the shores already for a distance of 50 miles. The deposition of silt will operate to close the eastern channel between Montague Island and the mainland, which has long since ceased to be navigable and will soon afford material which will be piled by the tides in the deeper channel to the westward, with the final result of filling it more or less completely, thus forming a brackish or saline lake comprising Sargents reach and the Great Horseshoe Curve 50 or 60 miles in length, into which the seepage waters of the Hardy will flow, charged with the salts picked up from the mud volcanoes to the northward. Before the channel is closed, however, the action of the tides will carry salt water far up the channels of both the Hardy and the old estuary, with a pertinent effect on the vegetation on the extensive tide-washed flats.

The new eastern channel is one probably not previously occupied by the river in its present condition, and the change adds to the delta the triangular area enclosed by the old channel below the "Colony mesa" to the Gulf, and the new channel, inclusive of great expanses of mud flats, and a range of gravel dunes or hillocks which find their culmination at the extreme northern end of the triangle immediately below where the new channel takes off from the old one.

In addition to increasing the area of the delta, serious disturbance of the plants and animals over an area of several hundred square miles may ensue. In a large part of it the composition of the flora will be totally altered. It is needless to say that the meager agricultural operations of the few Cocopah Indians who frequent the region will be seriously disturbed. So far as might be inferred from the reconnaisance already made of the conditions of flowage into the Laguna Maqutata, in the extreme western portion of the delta, no serious effect will be apparent in its irregular filling and shrinking by evaporation.

D. T. MACDOUGAL,
Director of Botanical Research,
Carnegie Institution.

* Bull. Amer. Geog. Society. January, 1906.


Changes in the
Estuary
of the
COLORADO RIVER.
G.Sykes, 1907.
COLORADO RIVER
Head of Tide water
Hardy's Colorado
New channel of the Colorado River
Hind Isd
Yard Slough
Santa Clara Slough
Montague Isd
Gore Isd
GULF OF CALIFORNIA
Ometepec Bay
115°10'
115°
114°50'
114°40'
114°30'
32°20'
32°10'
32°
31°50'
31°40'
31°30'

HONORS FOR AMUNDSEN

THE principal feature of the annual banquet of the National Geographic Society, December 14, was the presentation of the Hubbard Gold Medal of the Society to Captain Roald Amundsen by the Vice-President, Hon. Charles W. Fairbanks. Several hundred guests and members attended the dinner, including representatives from Argentine, Belgium, Bolivia, Denmark, France, Germany, Great Britain, Italy, Japan, Mexico, Norway, and Switzerland, and from all parts of the United States. Toasts were responded to by Hon. J. J. Jusserand, the French Ambassador; Hon. James Bryce, the British Ambassador; Representative Theodore Burton, of Ohio; Hon. Harvey D. Goulder, of Cleveland, and Representative J. Hampton Moore, of Pennsylvania. The President of the National Geographic Society, Dr. Willis L. Moore, acted as toastmaster. The speeches follow.

INTRODUCTION BY THE TOASTMASTER, THE PRESIDENT OF THE NATIONAL GEOGRAPHIC SOCIETY.

On January 13, 1908, the National Geographic Society will be twenty years old.

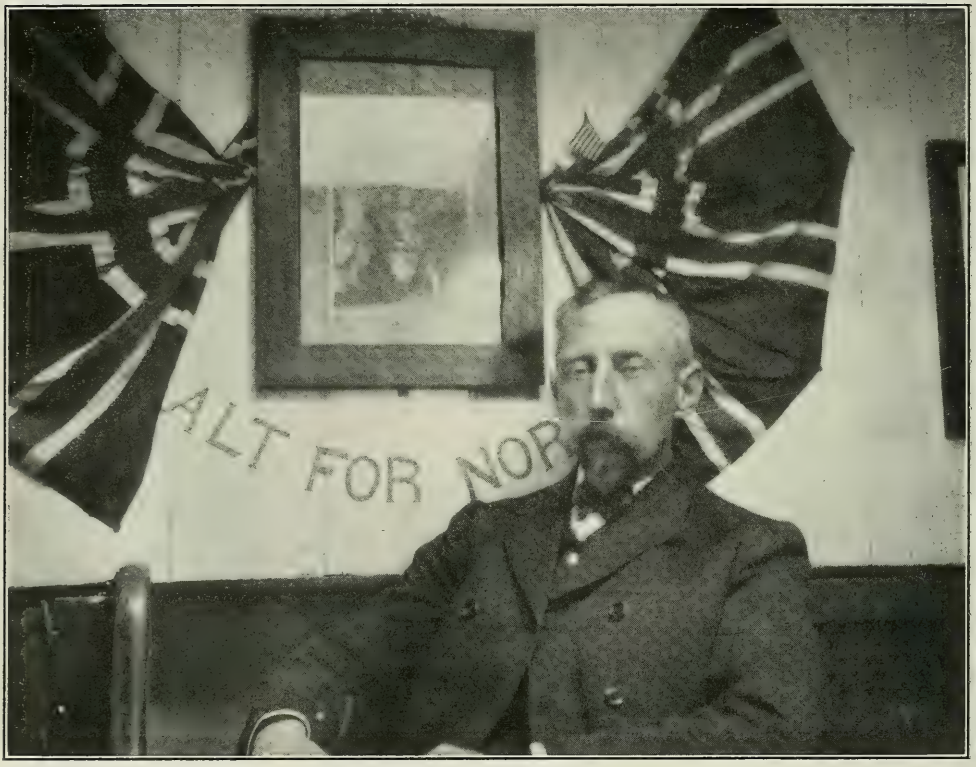
This organization, which is of such comparatively recent inauguration, today numbers a membership of over thirty thousand thinking, educated, working people. Its income is spent entirely in the collection and the dissemination of knowledge that we believe will work for the betterment of humanity. We endeavor to treat of the earth, the waters that cover it, the air that is above it, the configuration of the earth, the boundaries of land and water; and then to teach of the peoples that inhabit the earth—their economic, their political, and their social conditions. From our rostrum speak men who are masters of their subjects. Through our Magazine we disseminate their views throughout the large membership of the Society. Our object is to aid research and diffuse knowledge.

As in warfare "it is the man behind the gun," likewise in every peaceful endeavor it is still the man behind the gun; and, apropos of that, our Society takes pleasure in the fact that among those who direct the operations of this institution there are found such names as Alexander Graham Bell, Robert E. Peary, General Greely, Admiral Chester, of the Navy, Gen. John M. Wilson, of the Army, the former Chief of Engineers. But the list is long. I only refer to a few, so that you may know who are your hosts tonight. We, the members of the Board of Managers and the members of the Society, greet you and extend to you our hospitality.

The first condition requisite to great success in a man is a clear mind and a strong body. Such a condition produces as nearly as may be the perfect composite of the man. We are here tonight first to do honor to one who possesses the strong body and the clear mind, and an acute intellect. We wish to confer the honor of this Society upon him. By unanimous vote its Board of Managers has directed that a medal shall be presented to Captain Roald Amundsen for achieving the Northwest Passage and definitely locating the Magnetic North Pole; and to still further do him honor we are favored with the presence of one who also represents the clear mind in the strong body; for no man could rise to the dignity of Vice-President of these United States who does not possess those qualities. Therefore our Society feels honored by the presence of the Vice-President, and I will introduce him to present the medal to Captain Amundsen.

THE VICE-PRESIDENT, HON. CHARLES W. FAIRBANKS

Mr President, Members of the National Geographic Society, Ladies and Gentlemen: I want to congratulate this great Society upon what it has so splendidly accomplished, upon the work it is doing with such high intelligence and such devotion. The field of its en-



CAPTAIN ROALD AMUNDSEN IN THE CABIN OF THE GJOA

deavor is as wide as human nature and as all-embracing as the world itself.

Captain Roald Amundsen, the pleasant duty devolves upon me to present to you on behalf of the National Geographic Society this gold medal. It is presented to you because of what you have so splendidly accomplished. It is in recognition of your arduous and intelligent service in the great North. It is because of your scientific investigation with regard to the Magnetic North Pole. You have removed many of the doubts, much of the theoretical assumption with respect to the Magnetic North Pole and have established well-authenticated fact with regard to it—an achievement that is yours and only yours since the history of the world began.

This medal is presented to you further because of the fact that you are the first one to sail through the Northwest Passage in your own vessel. Many intrepid and resourceful explorers have for more than three centuries ineffectually attempted what you in God's providence have accomplished. There are many names associated with the attempt to accomplish what you have achieved. Their efforts were not crowned with the same success which have crowned yours; yet they each and all served to reduce greatly the zone of the unknown, and each and all have in a measure contributed to the triumph which finally is yours. I was gratified to read in your modest account of your own achievement the liberal praise you gave to all who have devoted their service to the accomplishment of the Northwest Passage. You are honored here in an especial degree.

It is a happy circumstance that there are assembled at this hospitable board tonight not only men distinguished in

science, in art; in literature, and in statesmanship in the United States, but here are gathered the representatives of the greatest countries upon this globe. The representatives of the chief nations of the earth are met here to do you honor. It has seemed to me always, as I have read the familiar story of the efforts and sacrifice of the explorers of all countries in the Arctic regions, that there is something in it of the heroic, when we contemplate the countless money that has been spent and the scores and scores of lives that have been sacrificed in extending the boundaries of our knowledge in that inhospitable quarter of the earth. I have believed that those who have laid down their lives there are entitled to the same honor the soldier wins when he lays his life down upon the battlefield of his country.

It is a felicitous fact that a Norseman should have first sailed through the Northwest Passage in his own vessel. We have a hospitality for him in this country. Many of our countrymen who dignify and honor American citizenship are fellow-countrymen of yours.

As I said before, this medal is given to you by this great Society because of what you have accomplished in science and in the extension of the domain of geographic knowledge. It is also presented to you because of the esteem of the Society for you personally. I have the very great honor, my dear sir, to present to you this mark of the respect of the National Geographic Society of America.

RESPONSE BY CAPT. ROALD AMUNDSEN

Mr Vice-President, Mr President, and Members of the National Geographic Society, Ladies and Gentlemen: I am highly honored and justly proud of the very high distinction which the National Geographic Society so graciously has bestowed upon me in presenting me with the Society's gold medal. This I have had the honor to receive from the hands of the Vice-President of this great Republic. I am no less grateful for the Society's demonstration of honor by electing me an honorary member of this the largest geographic society in the world. For this splendid token of distinction I have the great honor to express my very sincere gratitude to the members of the Society, among whom there are so many brilliant gentlemen, famous for achievement in scientific research. I see here tonight one whom I think I can say is the most excellent of the scientific explorers in the United States—in fact the most experienced scientific Arctic traveler of the day—Commander Robert E. Peary. I thank you from the bottom of my heart and wish the National Geographic Society all success.

THE TOASTMASTER

In the development of geographic knowledge on this continent there was one nation that was preëminent in exploring the vast interior of what was a great wilds only a hundred years ago. The interior of our country has preserved the names of many of those who first explored it, and given them to its cities. Marquette, Joliet, and La Salle will always be famous as the names of French explorers who entered at the mouth of the Saint Lawrence and passed through the Great Lakes and down the long stretches of the Father of Waters. Now it is appropriate that the ambassador from that nation which had so much to do with carrying a Christian civilization into the interior of this continent should be here to honor us with his presence. He will speak to the toast of the "Northmen's Travelings."

THE AMBASSADOR FROM FRANCE, HON. J. J. JUSSERAND

Once more a deed of valor, of pluck, and endurance has been performed by a Norseman. Valor, pluck, and endurance are highly appreciated in America, where so many connoisseurs and practicers of the same exist. It is in the nature and fitness of things that a Norseman be here tonight and be applauded and recompensed, as he has been, not only by the

medal, but by the eloquent words pronounced by the Vice-President of the United States and by the President of this Society.

Captain Amundsen followed the example of his ancestors. His ancestors may be proud of him, and he in turn may truly, when he goes back in thought towards the origins of his nation, be proud of his ancestors—those ancestors who started from the distant north and went to nearly all parts of the world.

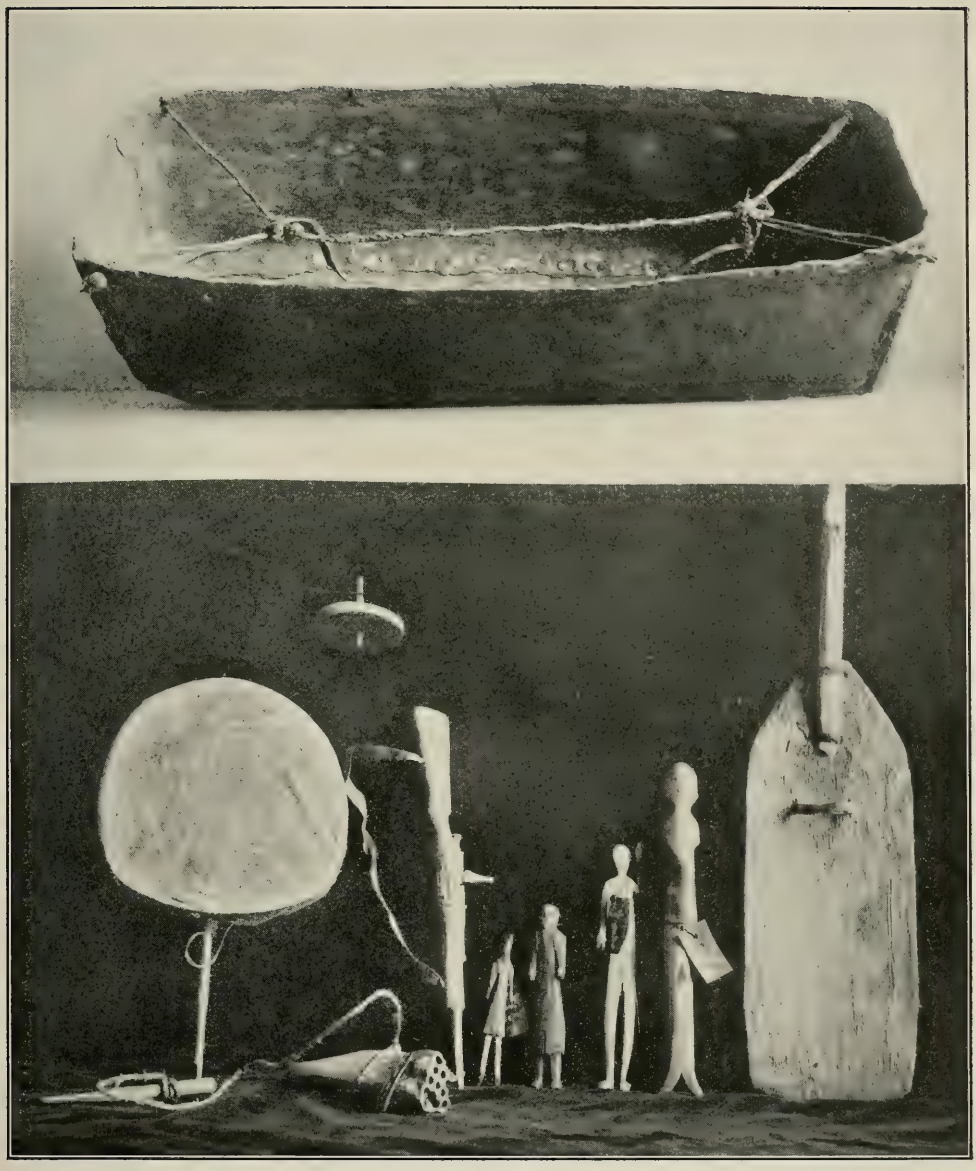
And as in those days all the parts of the world were equally unknown, as there was no National Geographic Society—we have just heard that it has existed only twenty years and I speak of twelve centuries ago—in those days when the whole world was unknown, a Norseman when he started would throw a feather in the air, and in the direction which the wind impressed on that feather, there he would go and discover.

Starting thus, the Norsemen went in every direction, as the wind and their pluck told them. They went to Russia; they founded the Kingdom of Novgorod; they were settled along the tributaries of the Black Sea. They took service under the Byzantine emperors, and some of them stationed in Greece inscribed their names on antique marble lions, as a sentry would nowadays (though forbidden) inscribe his name on his box. Those lions still exist, and many of you may have seen them in Venice, where they were transferred by Morosini in the seventeenth century, and where, sentries in their turn, they keep watch in front of the Arsenal main gate. They still bear on their marble skins the names in runic characters of the Scandinavian defenders of Byzantium.

The same sea rovers, following, as they said, the "swans' path," the "whales' road," went north and went west, settling in France, in England, in Iceland, and Greenland, and visiting America.

I do not think there is any doubt that the first European settlers were men from the north, sailing in those long wooden boats, of which several are preserved in Norway, having been found in *tumuli*. For some time it was doubted that such a feat was a possible one; but the experiment has been tried in our days and has proven successful. At the time of the Chicago Exposition Norsemen again crossed the Atlantic in the same sort of boat as their forefathers. An accurate copy of one of the viking ships dug from the Norway mounds, manned by the same number of men, with the same number of oars, having the same single mast, and no deck, started from Bergen, crossed the Atlantic, where it met some very rough weather, was for some time considered as lost, but it was not lost at all and it arrived in New York quite safely, the men having never had a moment's anxiety. That ship still exists. It is to be seen in Chicago, and in that big city, where there are so many interesting objects to be seen, none is more interesting than this Norsemen's boat.

It is a great honor for me to have been invited to address you and invited in the words your President used. He recalled in touching words my compatriots' contribution to a better knowledge of this country. To this there is no doubt they contributed, and the memory of such men as Laudonière, Joliet, La Salle, Marquette, Bienville, and several others certainly deserves to be cherished, as it is by the National Geographic Society. Some of the earliest maps of the Northern portion of this continent are French maps, drawn by hand, and they are preserved at our Ministry of Foreign Affairs, in Paris. There was, however, a period in French history when the French had a kind of fame that now, I dare say, they have no more. At the time of my youth Frenchmen were famous for their ignorance of geography. This fame we have lost, but I hope we have some other kinds of fame to console us for the loss of that one. For we too have since then emulated, not without some share of success, the deeds of our ancestors. We have begun again to discover countries. The North has not been our special department; it has rather been that of Norsemen, of Americans and



Cooking vessel of the Eskimo at King Williams Land made from copper sheeting of one of Sir John Franklin's vessels; about 15 inches long.

Eskimo toys; these are all in miniature, the snow shovel being about 8 inches long. To the left of it are seen 4 dolls made from wood and bone; then an imitation Krag-Jorgensen rifle, a spinning top, and a tambourine. Lying at the base is a toy with which the children amuse themselves by slinging the stick upward and catching it on one of the holes of the larger pieces. Photos by Captain Amundsen.

Fire-making apparatus, consisting of two pieces of wood, a reindeer bone, and reindeer bow with string.

One of the wooden sticks is spun until by friction against the other it produces a spark which is caught in dry moss.

ESKIMO MEANS OF MAKING FIRE

ESKIMO ENCAMPMENT, KING WILLIAMS LAND

Englishmen; and let us not forget that young, elegant and plucky Duke of the Abruzzi, a worthy compatriot of Columbus and Vespucci, and who was recently in your midst. Some new expedition led through air or through water, by some, maybe, among the men present here tonight, will certainly in the near future gain the first sight of the long-sought North Pole. We traveled mainly in other lands; and many parts of Asia, Africa, and South America, owing to French travelers, are no longer a blank on the map, and "Timbuctu, the mysterious," has no longer any mystery.

Considering so many expeditions undertaken for the sake of mankind at large by men from every land, undeterred by any danger, one goes back in thought to the time when mythical Saint Brandan, the Celtic Saint, started in his leather boat across the great ocean-sea to discover, and actually did discover, the island of Paradise.

Captain Amundsen and his peers make, in their way, somewhat similar journeys. The Geographic Society's guest tonight will not, I am sure, contradict me when I say that, amid the ice, while enduring hard privations and sufferings, he too has discovered the island of Paradise; for to men of heart Paradise is nothing else than duty fulfilled.

THE TOASTMASTER

Some years ago there appeared in public print a book on American institutions written by a foreigner. Other foreigners, especially English, had been to this country. They had remained the length of time necessary for the arrival and departure of a ship, and then had written works on America and American customs; so when this publication on the political conditions of America first appeared it was thought to be a work of the same superficial character as those that had preceded it. But as it was read it awakened interest; as it was studied it commanded admiration, and in course of time Bryce's "American Commonwealth" became the standard text-book on the political institutions of this country. It was

a leaven that was distributed at the right time and it is now bearing a splendid fruition. Millions of young patriotic Americans have received their greatest inspiration from that work. They have learned not only of the strength of the American Republic, but, what is better, they have learned from that great work its weaknesses. Forewarned is forearmed, and today I venture to say there is many a man in the national halls of legislation who is a wiser legislator; there is many a man casting his ballot who today will cast it on the side of righteousness and good government because he read that work written by a fair, impartial, analytical mind; and the National Geographic Society is glad to recognize in that author tonight the Ambassador from Great Britain, who will speak to us on the subject of geography.

THE BRITISH AMBASSADOR,
HON. JAMES BRYCE

Mr Vice-President, Mr President, Members of the National Geographic Society, Ladies and Gentlemen: I thank you, Mr President, for your very friendly and cordial reference to myself, for which I am most grateful. Perhaps, however, you will allow me to enter a very mild and deferential protest against one term which you applied to me. No Englishman, I hope, considers himself when in the United States to be a foreigner.

This, ladies and gentlemen, is a very interesting and a very cheerful occasion. It must be a cheerful occasion to you who have just been informed that your Society now has reached more than thirty thousand members, which I think must be equal to all the geographic societies of Europe put together. You have an abundant revenue which you well spend on the purposes of geography. The occasion is to many of us particularly enjoyable on account of the presence of a distinguished explorer from a nation which has great claims upon the recognition of geographers. He is of the nation whence came the Icelander Eric the Red, who was the first discoverer of America, and who was none the less the discoverer of America because he did not know he had discovered it. And Commander Amundsen is also the fellow-countryman of, I think, the man who performed the most extraordinary feat of daring and endurance in the pursuit of geographical knowledge that the history of the world records, Dr Fridtjof Nansen.

Nevertheless, I always feel a little touch of sadness when I am in a company of people devoted to geography, because geography is to me by far the most attractive and enjoyable of all pursuits, and I have a misgiving that I mistook my vocation when I took to history and politics and did not become a traveler and a geographer. Is there any study or pursuit which has so many sources of enjoyment and is altogether so attractive as the study of geography.

Geography, to begin with, is one of those things which everybody can follow. In many branches of science now the amateur has a hard time. Science has reached such a point of specialistic development that an amateur has practically no chance of making discoveries. But in geography we can all do something. Everybody can do a little bit of exploration, and make it thorough. I don't doubt you all have even done so in the case of some part of the country which was within your reach, and that you have succeeded in knowing a bit of the surface of this earth better than anybody else knew it before. That is something to say in an age like this.

In the next place geography has the great attraction and the immense interest of being the meeting point of all the natural sciences. Geology, botany, mineralogy, zoölogy, meteorology, some branches of physics, such as electricity and magnetism, and of course astronomy also, all touch and flow into geography. It is their meeting point; it takes something from each of them and gather together into one center for its investigations knowledge drawn from these different scientific lines of inquiry which bear upon the constitution of our planet.

GEOGRAPHY IS THE TELEPHONE EXCHANGE OF THE SCIENCES

And, lastly, geography has the unique interest of being the meeting point of the sciences of nature and the sciences of man. What is it, indeed, except a record of all those forms of natural environment which have made man what he is; which have guided his development; which have caused the differences of races; which at every point have influenced his march in one direction or another; which have given him the various forms of institutions; which have developed certain faculties in certain races along certain lines, and which have impressed upon the divers stocks of mankind as they stand now that variety in which the interest of the study of human nature so largely consists. It is this which makes geography the center to which the sciences of nature on the one hand and the sciences of man on the other converge.

Perhaps the greatest progress that has been made of late years in the study of history has consisted in bringing to bear upon it all the data which geography supplies, and in showing how much every nation has owed and must continue to owe to the geographical conditions under which it lives. The relations of geography to history make a fascinating subject, and if we had not many speeches looming up before us tonight I could willingly have followed it out.

There is just one drawback or defect which it has seemed to me attaches to this our favorite science. Its range is limited and is being narrowed. The field open to the geographer is no longer, as it might have been called five hundred years ago, practically infinite and inexhaustible. On the contrary, we are using up the world very fast. I suppose some of the members present remember what the maps of the world were like sixty years ago. I recollect when the whole center of Africa was practically a blank. In the middle of it there were marked upon the map a number of little hillocks, meant to indicate the mountains of the Moon, with figures of lions and elephants scattered here and there. Now the Ruwenzori has actually been climbed.

I remember an ancient terrestrial globe, twirling which and poring over it as it twirled I spent many happy hours, which showed for northwestern America scarcely anything except lines marking the voyages of Cook and Vancouver, and for northeastern Asia very little except the lines which traced the voyages of your illustrious countryman, Mr Ambassador from France, the famous navigator La Perouse.

But things have been greatly altered. Now there is no part of the earth's surface about which we do not know a great deal. Hardly anything is left for the imagination. Moreover, in those days the literary traveler was able to tell any traveler's tale he pleased. Those of you who have written books of travel, and I have no doubt there are some present, well know what is the temptation to the author to improve upon and amplify what he has seen in a little-known country. When I think of what that temptation is and of how often one has to abstain from exaggerating and giving a better turn to something one has seen, I feel like Lord Clive when, in describing the enormous opportunities he had had of increasing his wealth at the expense of the people he was conquering in India, he said, "I stand amazed at my own moderation."

The travelers of the future will have no such chance as some of us have had and some of us have used, let us hope, with moderation in embellishing the narratives of our explorations. I am afraid that the poets and all those who need imagination, who use imagination in literature, must suffer where there is nothing unknown left in the world. But we must make the best of it. We must recognize that our planet after all is limited. What you must begin to do is what has to be done in those parts of the West when the good lands have all been taken up and when it is impossible any longer to get virgin soil for cultivation. You must begin to apply intensive methods of cultivation. You must examine all your territory more thoroughly,

applying all the knowledge you can draw from sciences like geology, botany, and meteorology.

Your National Geographic Society has fortunately a very great and wide field open to it on this continent of North America. You and the Republic of Mexico, whose representative, my friend, Mr Creel, I am glad to see present tonight, have on this vast continent of North America, as we have also up in Canada, an enormous field open in which to conduct a minute scientific study, and the National Geographic Society may look forward to many, many years or centuries of useful activity in tracing down the geographical conditions, the natural history, and the resources and the rainfall and other climatic conditions of this enormous territory.

GEOGRAPHICAL SURGERY

You have also a new field open which seems to be one of peculiar, and indeed novel, interest. I do not quite know what to call it, whether to call it "Remedial Geography" or "Geographical Surgery." It is the taking of the surface of our earth and executing upon it various surgical operations intended to improve it and make it more useful for the service of man. You have embarked in some enormous works on this continent of that nature. You have dealt with the lower course of the great River Colorado, and have contemplated the making of an inland sea in a region which lies a little below the level of the ocean near that stream. You are meditating an enormous enterprise in the improvement of your internal navigation, proposing to construct a great canal and to improve that gigantic river which intersects the middle of your continent—endeavoring to turn it into a more complete and deeper channel for navigation than it has heretofore been. If you accomplish that work, you will have done a thing of which earlier ages might indeed have dreamed, but which nothing but your wealth and the resourses of modern science could have rendered possible.

And, lastly, you have embarked on that splendid enterprise in the Isthmus of Panama. One may say that all these projects come under the head of what may be called "Creative Geography." In attempting this creative policy you are making the world more habitable and profitable for all men. The world is no doubt using up its capital at a very rapid rate. Everywhere minerals and forests are being exploited, perhaps too fast and too recklessly. Here the forests are disappearing swiftly, and the same holds true of Norway. So both you here and we in Britain are using up our metals and our coals very fast. It is quite time that scientific geographers should come in and take stock of these resources and warn the nation, as I am happy to see that the President has already done in very emphatic, but not too emphatic, language, of the necessity of conserving all your natural resources and replacing those which, like the forests, can be replaced.

These are great functions for the National Geographic Society. It has a wide and useful field before it which it has shown that it knows how to work for the benefit of science and of the nation.

I appreciate the honor of having been called to address you and I thank you on behalf of your guests of tonight. I will venture to wish all prosperity and success to the National Geographic Society.

THE TOASTMASTER

The American forests are under the charge of the Agricultural Department. The American forests include areas that in themselves alone are sufficient to support a mighty empire. The Department of Agriculture controls this vast domain, conserves it and protects it, and also has many other important functions: It fights the ravages of insect pests that I do not hesitate to say would be more destructive than the ravages of the army of almost any invading foe. It guards the purity of our food supply. It studies the diseases of plants and animals and checks them. It sends its explorers into the far reaches of the earth to gather plants and animals that may be made economical and profitable to the American people. It develops and it teaches improved methods of husbandry that add hundreds of mil-

lions of dollars to the wealth of the American people. It carries on many lines of research. It distributes knowledge very much as our own Geographic Society does. It forecasts, as you know, the coming of the wind and the storms; and it may be interesting tonight for me to say that only yesterday, as the result of one of the lines of experimentation carried on under the department, an observation made at an altitude of four thousand feet at the experimental observatory at Mount Weather showed the curious anomaly of 38 degrees temperature, while the surface temperature in Washington showed only 24 degrees—14 degrees warmer in the upper layers of the air. The forecast without that upper air observation would have been snow today. But it was apparent to the forecaster that snow could not come from or through that extremely warm stratum of air. This is one of the lines of experimentation that is adding new knowledge to us in a geographic sense.

Now the responsibility for that government department, so beneficent to the American people in all of its purposes, lies in the foresight, the wisdom, and the statesmanship of the Senators and Representatives of the Federal Congress. They have never yet failed to give their cordial support to scientific researches when it meant something to benefit the American people; hence the United States Congress appropriates money—many times the amount of any other country—for the development and the diffusion of knowledge.

Now just a word, if I may, because the Secretary of that department is not here; and that is that that institution is presided over by the greatest practical as well as theoretical agriculturist, I believe, that the world has yet produced.

Unfortunately Senator Beveridge is indisposed and is unable to respond to the toast of the American forests. I look over these faces and I hardly find one that I would call upon without preparation to respond to that toast.

Briefly, it is certain that the welfare of posterity depends upon the protecting and conserving of these vast forest domains. They certainly do much to aid in restraining the floods. They may not change or alter the amount of precipitation, but without any question they do conserve that precipitation. They do restrain the rainfall on the various watersheds. They do render less destructive the floods that come from a given precipitation. The meteorologists are not certain but what the forests actually have an effect upon the thermal conditions, and therefore upon the rainfall itself.

Some recent experiments we have had made of the temperature over the surface of the earth as modified by the earth's covering have shown some very startling results. As an illustration, with contiguous surfaces that were precisely at the same level, thermometers exposed two feet above the surface and not a hundred yards apart would show over vegetation seven degrees lower temperature than over a sandy surface. Many times thermometers exposed over thickly covered vegetation at night would fall far below the freezing-point, while the temperature over the denuded surface would be much above the freezing-point. Hence it may be that the forests themselves, or the denuding of the forests, have really had an effect on the climate itself. The importance of conserving these great areas is conceded by nearly every one. I believe the nation has begun amply early by its wise legislation to protect these great areas for the benefit of the American people.

I remember hearing at one time of a banquet at which speeches were made with relation to the conserving of the waters of the Clyde. At the table there was a young American midshipman, who had partaken probably a little more of his cups than he should have done, so that he was not probably as politic in his remarks at a foreign table as he might have been. He arose and said: "Gentlemen, the Clyde would not form a gargle in the mouth of the Mississippi." Now the Father of Waters will be responded to by one probably who is better qualified to respond to that toast than any other man in the United States, the Honorable Theodore Burton.

THE FATHER OF WATERS. BY HON. THEODORE BURTON

The name "Father of Waters," or "Father of Running Waters," was first given by the Chippewa Indians, located south and west of Lake Superior, because they regarded the river as the greatest in the world. The French explorers accepted this name, May-see-see-bee, and since that day this appellation has been regarded not as a local exaggeration of the aborigines, but as a correct designation for this mighty river.

It is not only customary but appropriate to speak of the Mississippi in superlatives. True, it is surpassed in some particulars by other streams. Its drainage area is not so large as that of the Amazon or the Nile, and is equaled if not excelled by those of the Obi, the Congo, and the Rio de la Plata. There are perhaps ten or twelve rivers that carry to the sea a greater volume of water than does the Mississippi. In the population of the area tributary to it it is exceeded by the Ganges and by at least one river of China. The traffic that is borne upon its waters is far exceeded by that of the Rhine, the Volga, and by other minor rivers of Europe and of the United States. But in all the essential qualities which belong to a great river and a great river valley, as well as in those which make for modern progress, the Mississippi far excels them all.

ESKIMO COOKING POT MADE FROM STONE, AT KING WILLIAMS LAND

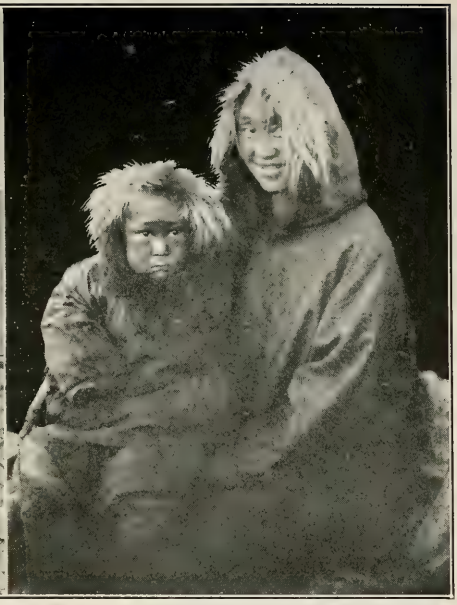
The most notable characteristic of the Mississippi is its infinite variety, manifested alike in products, climate, soil and population. This is partially due to the fact that, unlike most of the other leading rivers of the earth, it flows from north to south, and nearly in a direct line.

This same variety is exhibited in the motives and great events which are chronicled in the history of its discovery and the early settlement of the valley. It has been sometimes said that Vespucius, in the year 1498, passed by the mouth of the Mississippi, but the records of his voyages are of such uncertain authenticity that we cannot rely upon them. Other Spanish explorers—Pineda in 1519, Narvaez and De Vaca in 1528—saw the mouth of the Mississippi, but did not enter the promised land. The first expedition to cross the river or travel extensively upon its waters was that of De Soto; his included the flower of the Castilian youth, and was actuated by cupidity, the discovery of the Mississippi in early May, 1541, being a mere incident.

Entirely different in nature were the French explorations of 132 years later. Father Marquette, in 1673, was moved by religious zeal, and when ordered to proceed toward the river wrote of "the happy necessity of exposing his life for the salvation of those nations, and particularly for the Illinois." He passed down from the mouth of the Wisconsin to the mouth of the Arkansas, starting out with the supposition that the great northerly portion of the river flowed to the Gulf of California or the Pacific Ocean. His expedition may be termed a discovery, because it established the identity between the northerly and southerly

MONUMENT IN MEMORY OF SIR JOHN FRANKLIN

Erected on King Williams Land, where the relics of his party were found



ESKIMO AT HERSCHEL ISLAND

portions of the Mississippi. Finally, in 1861, we have the voyage of La Salle, the most untiring and enthusiastic of all the explorers of the West, prompted by desire for adventure, by love of trade, and the wish to add to the domains and increase the glory of France. He passed from the mouth of the Illinois to the very delta of the Mississippi.

Time would fail me if I were to speak of the various influences of different nationalities on the Mississippi River. The Spanish, French, and English all have joined in giving its magnificent valley that cosmopolitan population which is typical of strength and progress the world over.

It was inevitable that this splendid empire should belong to one nation. It was made to be both a geographical and a political unit. In the early days of the Republic this ultimate unity was constantly kept in mind. When, later in our history, an effort was made for the severance of the states bordering upon its waters, those who made that attempt stood athwart the pathway of destiny. Their embattled legions could not succeed, for it was fate that the valley of the Mississippi should be part of a united whole, and that the Mississippi River should flow on to the sea through one great country. Its valley is now, and must in greater degree in the future, assume a preëminent position as the heart of the nation, the source of its great political movements, and the most progressive portion of the globe. Approximately two-fifths of the area of the United States and half of its population belong to this valley.

NO LONGER A HIGHWAY OF COMMERCE

Among the great problems of common interest to all the inhabitants of the valley, the foremost is that of navigation. In the ante-bellum days, the Mississippi was one of the world's great waterways. But for thirty years navigation there has been in its decadence, a condition which has been very correctly depicted by our

foremost American humorist in his book, "Life on the Mississippi," written twenty-five years ago. Models of boats have not been improved; towns have been shut off from connections by railway tracks; facilities for loading and unloading are scarcely better than in De Soto's day; but with the increase of transportation and the recognition of the inadequacy of present agencies and facilities there is no doubt that the time has come when an effort must be made to restore this river to the position it once occupied as a great artery of commerce. And it is perhaps not too bold a conjecture to foretell that the question whether transportation shall be more and more conducted by rail, or whether the rivers of the country shall bear an increasingly important part, will be worked out by trial upon the Mississippi River and its chief tributary, the Ohio.

PREVENTION OF FLOODS BY RESERVOIRS

Another subject which will arouse attention with reference to the Mississippi is the prevention of the enormous floods which create such devastation year by year. Great progress has been made in this regard. The method most relied upon has been that of building levees. In this connection I may say that of late a claim has been made that by the impounding of the waters in the upper portion of the Mississippi and in its tributaries the force of these inundations may be broken. This plan was dismissed as chimerical by the engineers of fifty years ago, but it is again worthy of careful consideration at this time, since topographical surveys now give a better knowledge of the subject. That which seemed entirely impossible in the nineteenth century may be very easy of achievement in the twentieth.

Again, while it may be in part a dream at present, effort should be made for the clarification of the waters of the Mississippi. The chief contributor that makes it a muddy stream is the Missouri, and it has been estimated that each year four hundred million tons of silt are carried along the bed of the river toward the sea—a quantity comparable with and perhaps even greater than the amount of excavation required for the construction of the Panama Canal. Not in a day, nor yet in a year, but in the generations to come, we may hope that this river will be so bettered by the protection of banks and by treatment of soil in the adjacent lands as to remove its present quality of muddiness.

Another problem is the preservation of forests, not only for the sake of the timber supply, but for the moderation of the discharge of waters into the river. Still another, pertaining to many portions of the basin, will be the conservation of waters so that the lands where rainfall does not now exist may be so supplied by irrigation as to open up hundreds of millions of acres for settlement. With great rapidity the resources of this country have been exhausted. It is now time to encourage the practice of economy and conservation. The marvelous wealth of this valley should be preserved for future generations, and provision should be made with great care for the maintenance of that equal opportunity which ought to be the birthright of every citizen of the Republic, but which monopolization at present threatens.

I congratulate this Society for the interest displayed this evening in the conservation and utilization of our resources. I am glad to hear a note of warning sounded, and I hope that by your activities you may exert a beneficent influence in this direction equal to that which you have exerted in other branches of endeavor.

THE TOASTMASTER

In creating the Inland Water Ways Commission for the purpose of studying this great project for the improvement of the Mississippi, the President honored this Society by selecting for the Secretary of that organization one who for years has been one of the most active workers in this institution. I will introduce Dr W J McGee to say a few words.

Dr McGee outlined the objects of the Commission, and referred to the fact that the present agitation to make our rivers more useful to the country is the third waterway movement in our history; the second, directed by Albert Gallatin and encouraged by Thomas Jefferson (then Secretary of State and President, respectively) 99 years ago, unhappily came to naught; but the first agitation, started by George Washington on the Potomac River, led directly to the Annapolis Conference of 1786, and thence to the Constitutional Convention of 120 years ago, in which the Nation found being.

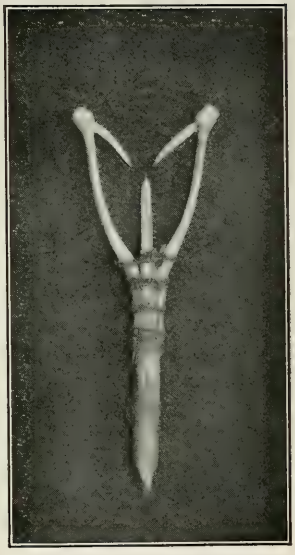
The toastmaster then introduced Mr Goulder as follows:

Some years ago a young man living in the Lake region conceived the idea that he would like to study for the profession of the law. Did he enter a law school? No. He shipped before the mast. He sailed for two years on a sailing vessel, learning every rope and part of its mechanism. From stoker to captain he learned all the various duties of navigating a great steamship, and then he began the study of law, and in course of time became the great admiralty lawyer of the Lake region. He knows all the sailing courses; he knows every port and harbor in the Great Lake region, no matter how small, and is himself interested in vessel properties. I shall ask the Hon. Harvey Goulder, of Cleveland, to respond to the toast of the "Five Inland Seas."

THE FIVE INLAND SEAS. BY HON. HARVEY GOULDER

You have given me a topic, fit subject for a volume, embracing as it does the grandest industrial help to a nation and to the world which history presents. No man may contemplate the use of the Great Lakes, the five inland seas, and their far-reaching effect, without being inspired with greater courage for the future of his own environment.

Geographically speaking, these five great inland seas, with their river connections and outlet, constitute the St. Lawrence system. With the exception of Lake Michigan they mark or line the boundary between us and our friendly and vigorous neighbor for some 1,800 miles.



THE HEAD OF AN ESKIMO FISHING SPEAR

The fisherman thrusts the weapon across the fish's body, which is held by the three prongs.

In 1836 the state of Ohio and the territory of Michigan nearly came to blows about the dividing line between them and in the proposed compromise Michigan rejected the upper peninsula as worthless, but she afterwards accepted it. In 1840, when on application of Michigan a bill was before Congress for a land grant to aid the building of a lock to overcome the 19 foot drop in water level at Sault Ste. Marie, Henry Clay said in a speech, which defeated the particular bill, "it is a work quite beyond the remotest settlement of the United States, if not in the moon."

It was in 1871, when application was made for a land grant to aid a railroad from the twin cities at the head of the Mississippi, to the head of Lake Superior,

ESKIMO HUNTER, KING WILLIAMS LAND

that Proctor Knott ridiculed Duluth, the future great and Zenith City of the unsalted seas.

Last week, a steel freight steamer with every modern convenience for economic transportation, brought down from Duluth through the Sault canal and delivered at Buffalo the largest cargo of wheat ever carried by any ship in the world, 422,000 bushels; enough to make 84,000 barrels of flour, and at 14 bushels to the acre, representing the product of 30,000 acres, approximately 50 square miles; and I have it from official sources that we may take this average. In 1907, in about 232 days of navigation, Duluth shipped in the single item of ore over 13,000,000 long tons, and her sister city across the bay over 7,000,000 tons more.

One-third of all the tonnage under the American flag is employed on the Great Lakes. As an example of the progress of transportation a comparison may be illustrative. In the last fiscal year, of ships of over 1,000 tons custom-house measurement, there were built in other parts of the United States, 18 steel and wooden steamers, ferry boats and schooners, with a tonnage of 41,355 tons. In the same period on the lakes there were built 40 steel steamers, each upward of 1,000 tons, and of aggregate custom-house tonnage of 232,366 tons. It may not be out of place to say that more than 30 of these exceeded 5,000 tons custom-house measurements. The custom-house measurement, it must be borne in mind, represents only something more than one-half the actual dead weight carrying capacity of our lake ships at the draft which they can carry through the shallower connecting waters between the lakes themselves. Therefore, it is that a steel steamer of the prevailing type, say from 556 to over 600 feet length, 54 to 60 feet beam and 32 feet depth carries 10,000, or more, long tons of iron ore on a draft of a little over 18 feet to which connecting waters consign her, and 12,000 to 14,000 tons in such a trade as between Escanaba and the great steel works at the head of Lake Michigan, in which trade the steamer is not required to encounter the restricted draft compelled in the connection betwen Lake Superior and Lake Huron and Lake Erie, by reason of natural conditions which I have not the time to explain.

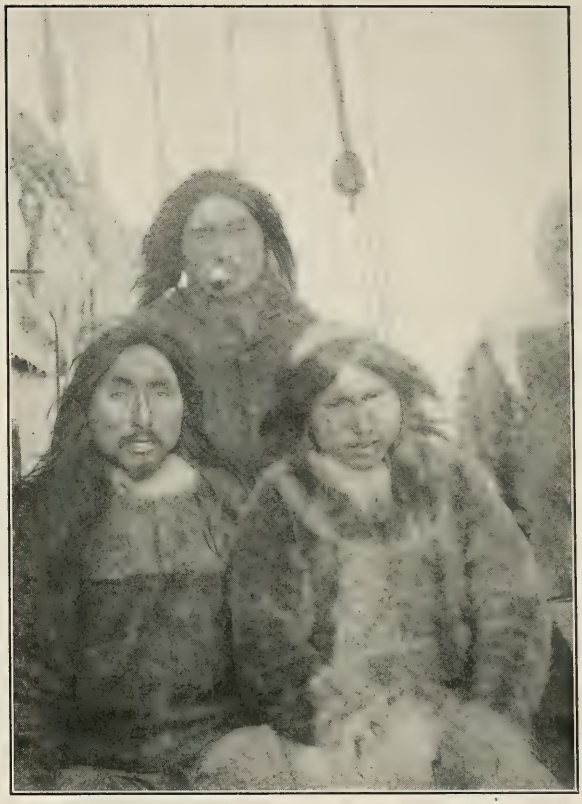
Concurrently have come inventions for the rapid handling of cargo, so that one of these great cargoes of iron ore or grain can be, and some times is, loaded in a couple of hours and unloaded within five hours. Covering a voyage between Lake Erie ports and the head of Lake Superior such a vessel makes a round trip in from 7 to 12 days according as she goes without cargo one way or is loaded each way and subject to congestion at either terminal.

Such has been the progress and demand for transportation that the railroads are so choked, especially at their terminals, that they are, and have been, exhausting every device that ingenuity, involving concurrence of action between railroads and shippers, can suggest to prevent mileage service of the average freight car being reduced below the already alarming point, said to be within past ten years from 30 miles to 20 miles per day.

The Great Lakes system is furnishing in its cheap water transportation about one-third as much ton-mile service in its eight months season as the combined service of all the railroads of the United States in the year.

The average ton-mile cost by our railroads, which is, generally speaking, half or less than the cost in Europe, runs over 8 mills. The favorably located and best equipped may come down to one-half of this but not lower unless we regard a very few exceptional cases to which a general rule could not be applied. The ton-mile cost in the Great Lakes haul is about one-tenth the average of the rail haul and say one-fifth that of the most favored rail routes with the exceptions stated.

While Henry Clay protested, strong, helpful men of business forced a passage between the east and the magnificent northwest of the United States and Canada which we see today. The state of Michigan was induced to take upon herself the building of a lock at the Sault. To accomplish the cherished idea it is said that some of these men traveled 50 miles on snow-shoes through a winter wilderness to attend a meeting, lest the project fail or falter.



ESKIMO AT KING WILLIAMS LAND

It did not fail because it was the destiny of the great American and Canadian Northwest to become the chief grainery of the world. It was the destiny of the United States to become the imperial factor in iron and steel and in industrial pursuits; and the destiny of the United States has never yet halted for lack of human instruments.

So the Indian legend that Gargantua, the great chief and demi-god, when he found the waters of Lake Superior rising, put on his great boots and walked around

the lake until he found at the Sault that the great white beaver had built a dam, and that he kicked away the dam and opened up the intercourse between the lower lakes and the great northwest is not true. It was those sturdy men of Michigan and the East who, foreseeing the almost boundless possibilities of the Northwest, broke the barrier with the prosaic lock and canal which ever since their grateful successors have improved and enlarged till now through this gateway in the two-thirds of the year allotted to our northern navigation there will have passed in this season of 1907 almost, if not quite, 60,000,000 tons of cargo—nearly four times that through the Suez and nearly six times the estimate for the Panama in its tenth year of operation.

The actual saving in freight has in the past single year exceeded all the cost of all the improvements beginning with the first lock in 1855 and throughout the entire chain of lakes. No man, woman, or child in this country but has felt and enjoyed its beneficent influence and results, while people in far-off lands have been distinctly benefited.

From Lake Superior comes this year more than 40,000,000 of iron ore so rich in the metal that it will produce more than 80 per cent. of the output of pig iron for the year in this country, which in turn will equal or exceed the combined output of Great Britain, Germany, and France; and the blessing to humanity, the good hope, and the good cheer of it all is that all the output of all the countries will be needed to meet the advancing requirements of the world. This marvelous development, so in its infancy, is due definitely and directly to the five inland seas.

THE TOASTMASTER

The next toast will be responded to by Hon. J. Hampton Moore, who is a little bit handicapped in name, but what he knows about the water arteries on the Atlantic Coast is not a gift. It was acquired by long and patient study.

THE ARTERIES TO THE ATLANTIC. BY HON. J. HAMPTON MOORE

In the boundaries of the fifteen states along the Atlantic Seaboard the East retains a population of thirty millions of people.

We have started in the East along the Atlantic coast what promises to be a great campaign, hand in hand with our brother of the middle and extreme West, for the development of the waterways of this country. We do not yet quite understand their enormous extent. We have passed beyond the important question of forestry because we have very few forests left. They have been denuded for the purposes of the West, and we have not yet quite come to understand the importance of developing the waterways in the East as some of you have been developing them in the West. But recently, by reason of the congestion of freight traffic, by reason of the incapacity of the railroads of the country to carry the product of the mechanics of the country and of the manufacturers of the country, notwithstanding that they are pushing forward with giant strides, and in my own city of Philadelphia are turning out eight and nine locomotives a day from one of the great works alone; notwithstanding this great development in manufactures, the hand of the artisan and of the laborer and the mechanic, combined with the energy and the capital of the manufacturer, is exceeding the carrying capacity of the railroads and has brought us to a realization of the importance of the waterways as a means of carrying freight, on competitive, or, if you please, on relief lines. We have talked recently of the development of an inland chain. It is not altogether a new idea, but the movement to work for it systematically is of recent origin.

We believe that for the purposes of commerce, as well as for the purposes of war, it would be important not alone to great manufacturing and industrial interests, not alone for the purpose of carrying commodities of heavy, bulky

COAL FLOATED DOWN THE OHIO RIVER TO CINCINNATI

It cost one-third of a mill per ton per mile. The illustration shows a part of a single fleet of barges containing 60,000 tons of coal. Photo from Will L. Finch, Cincinnati

freight, but for the purpose of carrying passengers too.

We should have an inland chain of waterways complete from Boston, on the north, to Beaufort, North Carolina, on the south, a distance of something over a thousand miles, with opportunities to go inland at least 150 miles; these waterways to be serviceable for canal barges, for ships of commerce, and, if you please, for ships of war. We have been thinking, as this question has arisen, of the isolated long seaboard, of the property imperiled, and the lives lost; we have been thinking, too, of those silent vigils of the day and night who constitute the life guard of this country, and who patrol every foot of the Atlantic seaboard, and of our other seaboards while we are snug at home through the wintry season. On the shores of Cape Cod alone, as statistics recently handed to me show, there were, during a period of twenty years following 1881, as many as one thousand wrecks of vessels carrying precious cargoes of human beings and of freight. The development of inland waterways gives courage against the dangers of the Capes, of the shoals of Barnegat, and of the terrors of Cape Hatteras, now almost a graveyard of the seamen of the centuries.

We are hoping the happy time will come when the North and the South will be united upon the proposition to make available for commerce and to make available, if necessary, for purposes of war, though there will be no war with foreign powers while we are represented by foreign ambassadors such as sit about

this board tonight—in fact, to make it available for any emergency. The construction of this great inland waterway, we believe, will be productive not alone of increased manufactures, but will afford an opportunity to the cotton planter of the South to send his goods north at a cheaper and better rate of freight, and will open up the farm lands that have barely been considered in the general waterway agitation up to this time.

If you will take your maps when you return to your homes and draw your finger down the line from Boston to Beaufort, you will see a water-course a thousand miles long, through which you could pass in a small boat from the southern side of Cape Cod, but through which no large boat could pass uninterruptedly, because there is not sufficient depth to make it available for purposes of commerce. There are several strips of land in the way. Cape Cod itself has not been cut through. But one canal is now being cut through by the government of the state of Massachusetts, and another is on the plans for construction. There would be a saving of seventy miles around the perilous shoals of Cape Cod. Following the course down Long Island Sound you would come from the harbor of New York through the Raritan Canal, a distance of 34 miles, across New Jersey to the Delaware River. That canal is entirely too shallow for commerce or war. It should be made deeper and broader to meet the necessities of the oncoming generations. Pass on down the Delaware to the city of Philadelphia. Pass Trenton and Wilmington and come to the state of Delaware, and there you strike the Chesapeake and Delaware Canal. Only thirteen miles of open water-course would carry any vessel not exceeding 9 feet in draft, out into the Chesapeake Bay, and on down the Chesapeake Bay to Norfolk, and then through the Albemarle and Pamlico Sounds out through the sand dunes of North Carolina again into the Atlantic Ocean. You speak of those things that are attractive to you in your geographic studies, those things that are pleasant to you in your scientific research; think of this as a problem of the future; think of this as something that will help to develop this country and unite the sections in bonds of commercial and industrial intercourse; in those bonds which make for the peace and prosperity of the land.

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Mr Reid S. Baker.
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Mr George Herbert Beaman.
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Mr Sydney Bieber.
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Mr Frederic de Billiets.
General John S. Black, President Civil Service Commission.
Mr and Mrs John S. Blair.
Dr Wm R. Blair.
Col. and Mrs Henry F. Blount.
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Mr Randolph Bourne.
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Mr J. A. Breckons.
Mr Robert Brott.
Miss Anna B. D. Brown.
Mr William Wallace Brown.
Mrs. Brown.
Hon. C. Brun, The Danish Minister.
Dr Joseph H. Bryan.
Hon. James Bryce, The British Ambassador.
Mrs Bryce.
Captain Buckle, British Royal Artillery.
Mrs Buckle.
Rev. Dr S. J. Buel, President of Georgetown University.
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Representative H. R. Burton, of Delaware.
Representative Theodore Burton, of Ohio.
Hon. Y. Calderon, Bolivian Minister.
Madame Calderon.
Mr Frank G. Carpenter.

Mrs Carpenter.
Col. Thos. L. Casey, U. S. Army.
Mrs Casey.
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Mr and Mrs Melville Church.
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Madame Creel.
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Miss Doyle.
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Mr and Mrs F. B. Eichelberger.
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Miss Emery.
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Hon. John W. Foster, formerly Secretary of State.
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Mr and Mrs. Henry Goldmark.
Col. Green Clay Goodloe.
Mr and Mrs Gilbert H. Grosvenor.
Mr and Mrs Harvey D. Goulder, of Cleveland.
Judge A. B. Hagner.
Dr Arnold Hague.
Dr Albert Hale.
Count Hanihara, of the Japanese Embassy.
Miss Gena Russell Harding.
Representative and Mrs Kittredge Haskins, of Vermont.
Mr Phelan E. Haron.
Miss C. L. Harrold.
Mr A. G. Heaton.
Hon. Hilary A. Herbert, formerly Secretary of the Navy.
Mr W. H. Hesse.
Hon. David Jayne Hill, American Ambassador to Germany.
Mr Joseph A. Hill.
Mr and Mrs Frank J. Hogan.
Mr E. F. Holbrook.
Mr W. R. Hollister.
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Madame Jusserand.
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Miss Alice Kern.
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Mr John Oliver La Gorce.
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Baron Moncheur, Belgian Minister.
Baroness Moncheur.
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Rev. Dr and Mrs C. Ernest Smith.
Mr and Mrs F. Carl Smith.
Dr George Otis Smith, Director U. S. Geological Survey.
Mr and Mrs Odell S. Smith.
Senator and Mrs Smoot, of Utah.
Mr and Mrs Edgar C. Snyder.
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Mr and Mrs H. Steenerson.
Dr Geo. M. Sternberg, formerly Surgeon General U. S. Navy.
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Mr Frank Sutton.
Miss Florence M. Taylor.
Mr Henry W. Taylor.
Miss Mary E. Taylor.
Mr John Adams Thayer.
Mr W. B. Thompson.
Mr Theodore H. Tiller.
Hon. O. H. Tittmann, Superintendent U. S. Coast and Geodetic Survey.
Hon. Leo Vogel, The Swiss Minister.
Mr and Mrs F. B. Vrooman.
Mr and Mrs Ernest G. Walker.
Mr and Mrs M. I. Weller.
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Mr and Mrs. J. F. Wilson.
Col. and Mrs A. S. Worthington.
Miss Hallie L. Wright.

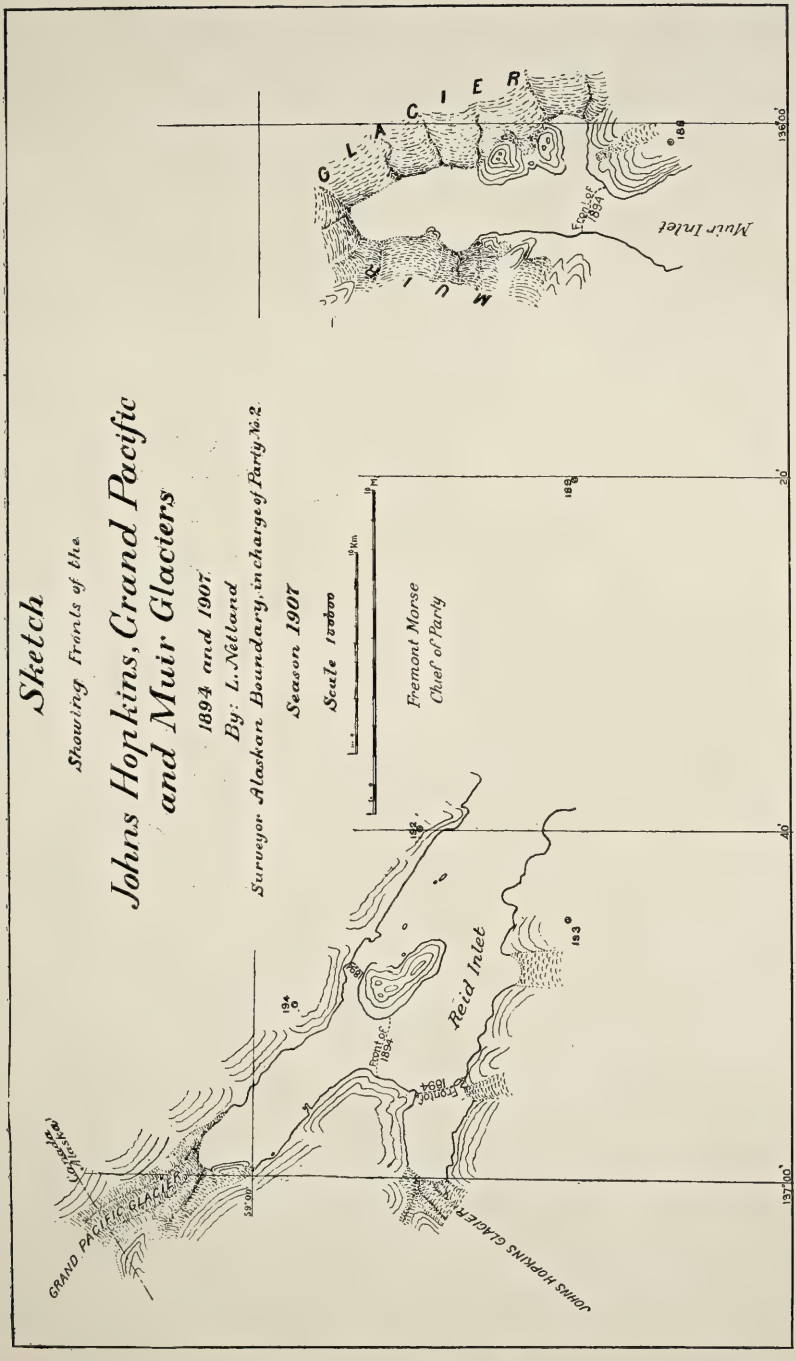
THE RECESSION OF THE GLACIERS OF GLACIER BAY, ALASKA

By Fremont Morse, U. S. Coast and Geodetic Survey

ONE of the most interesting points brought out in our past season's work in Glacier Bay is the remarkable retreat of the glaciers discharging into that body of water. The surveys made by the Canadian parties in 1894 located the fronts of the glaciers at that time and give us data for an accurate determination of the amount of the recession, when taken in connection with our work this year (1907).

The primary cause of the changes which have taken place can without doubt be traced to the great Yakutat earthquake of September, 1899. At that time an earthquake occurred which was apparently central in Disenchantment Bay, or the upper end of Yakutat Bay, and which upheaved the rocks in that vicinity, by actual measurement, some 30 or 40 feet. In one place it was measured and found to be 47 feet. This great disturbance of the earth's crust profoundly affected the glaciers in Glacier Bay. Previous to that time for many years the excursion steamers of the Pacific Coast

* From a report to Hon. O. H. Tittmann, U. S. Boundary Commissioner.



Steamship Company had regularly run up into the bay, and had experienced little or no difficulty in approaching within a few hundred yards, or as close as it was deemed safe, to the face of the Muir glacier. The earthquake changed all that. The glaciers seem to have been completely shattered by the shock. Vast masses of ice were discharged, which so choked the bay that it was impossible for

steamers to enter. So also the breaking up of the ice masses seems to have been so thorough that great quantities have continued to be discharged every year since then, and it was not until this summer that the excursion boats were able to approach to within less than from 10 to 20 miles of the front of the Muir. The steamer *Spokane,* commanded by the veteran Capt. James Carroll, succeeded in getting up to within about a mile of the face of that glacier on one of her trips this year.

Formerly the Muir presented a perpendicular front at least 200 feet in height, from which huge bergs were detached at frequent intervals. The sight and sound of one of these vast masses falling from the cliff, or suddenly appearing from the submarine ice-foot, was something which once witnessed was not to be forgotten. It was grand and impressive beyond description.

Unfortunately the recent changes in the Muir have not increased its impressiveness from a scenic standpoint. Instead of the imposing cliff of ice, the front is sloping, and seems to be far less active than formerly. Its shape is entirely changed. It is now divided into two branches, the two branches being caused by what were formerly two "nunataks" in the body of the glacier. The eastern arm discharges but little, and appears to be nearly dead. The front of the western arm is in shape of an elongated basin, and, as above stated, slopes gently. It is badly crevassed; a point of rock juts out at the water's edge on the west side of the basin. This is apparently the prolongation of a ridge which outcrops through the ice-field further back, and which will soon, if the glacier continues to retreat at its present rate, make two arms of the present western one. It is from this western arm that the bulk of the ice is now discharged.

That the changes now going on will continue in the same direction is by no means certain. All around Glacier Bay from Bartlett Bay up into Hugh Miller Inlet, and including the Muir Inlet, there are evidences that there was once before a retreat of the glaciers followed by an advance. Stumps of large trees, *in situ,* along the shore line, testify unmistakably that for a long period the country was free from ice, that forests grew, that the ice advanced and overwhelmed them, and has again retreated. Who can predict what will come next?

THE NATIONAL GEOGRAPHIC SOCIETY

Friday, January 31, 1908—"The Conservation of Our Natural Resources." Mr Gifford Pinchot, Chief of the U. S. Forest Service.

Friday, February 7, 1908—"South Africa: The Natives and the Mines." Mr Gardiner F. Williams, author of "The Diamond Mines of South Africa" and for many years General Manager of the De Beers Diamond Mines, Kimberley. Illustrated.

Friday, February 14, 1908—"The Deep-water Route from Chicago to the Gulf and its Connections." Hon. Joseph E. Ransdell, Member of Congress from Louisiana and President of the Rivers and Harbors Congress.

Friday, February 21, 1908—Hon. George Shiras, 3rd, of Pittsburg, has accepted the invitation of the National Geographic Society to address the Society on some of his experiences in hunting wild game with the camera. Illustrated.

Friday, February 28, 1908—"Holland's War with the Sea." Prof. J. Howard Gore. Illustrated.

Friday, March 6, 1908—"The Missions of California." Hon. Joseph R. Knowland, Member of Congress from California.

Friday, March 13, 1908—"Arizona—The Egypt of the New World." Mr Frederick Monsen. Mr Monsen describes not only the ancient ruins, but the country as it is today, with its Indian tribes, Spanish-Mexican settlements, and American towns. The wonderful Snake Dance of the Hopis will be shown.

Friday, March 20, 1908—"Persia—Past and Present." Dr A. V. Williams-Jackson, of Columbia University. Illustrated with unusual pictures taken by Professor Jackson on extensive journeys through the ancient kingdom.

Friday, March 27, 1908—"The Geography of the Sea." Rear Admiral Colby M. Chester, U. S. Navy.

Friday, April 3, 1908—"Cathedrals, Mosques, and Temples of the World." Hon. O. P. Austin, Chief U. S. Bureau of Statistics. Illustrated.

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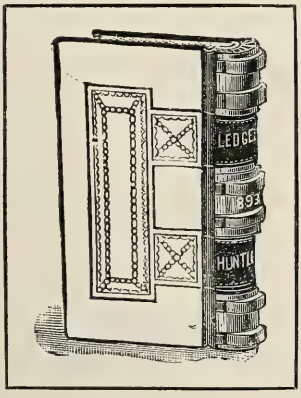

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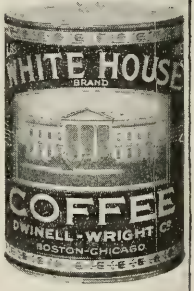

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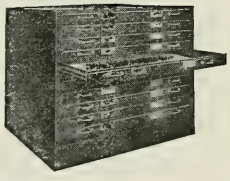

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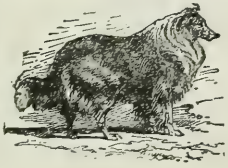

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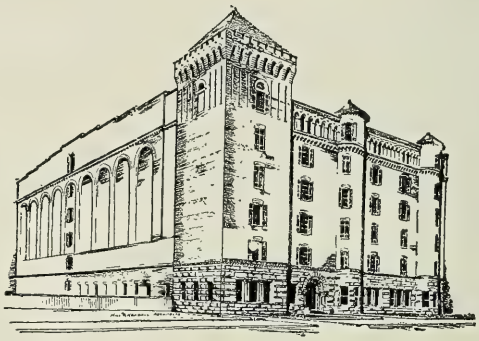

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THE NATIONAL GEOGRAPHIC MAGAZINE

THE POLICEMEN OF THE AIR

An Account of the Biological Survey of the Department of Agriculture

BY HENRY WETHERBEE HENSHAW

THE pursuit of science solely for its own sake, however commendable it may be, is not the spirit that animates our government in its support of scientific research. In its aims and ambitions this is a practical age. Thousands of men are experimenting, inventing, and prying into the secrets of nature for the avowed purpose of utilizing their discoveries for the practical benefit of mankind. Applied science has come to occupy a very important place in our government institutions, and in none is it more important than in the Department of Agriculture.

From small beginnings, the department in little less than half a century has expanded in every direction, and in the last decade, under the able management of Secretary Wilson, has grown to huge proportions. Its work is divided among numerous bureaus, each with a distinct line of research, and a small army of assistants is employed, many of whom are engaged in various fields of scientific investigation for the benefit of the American farmer.

It is the work of one of its bureaus, the Biological Survey, that concerns us here. The Survey had its beginning in 1885, when its present head, Doctor C. Hart Merriam, with one assistant, began to investigate the economic relations of birds to agriculture. The scope of the field was soon enlarged to include the kindred subject of economic mammalogy. In addition to these important subjects, its duties now include the study of the geographic distribution of animals and plants with special reference to the determination of life and crop zones, and the supervision of matters relating to game protection and the importation of foreign birds and animals.

RELATION OF BIRDS TO AGRICULTURE

When the Survey began its work very few accurate observations on the food of birds had been recorded. Most of the published information bearing on the subject rested on field observation only, and, besides the liability to error from faulty or insufficient observations, the data gathered in this way were entirely inadequate. It is not enough to be told that birds feed on insects; we must know the particular kinds they eat. The fact that the crow sometimes eats corn is not sufficient evidence upon which to condemn

From the Biological Survey

FOUR COMMON SEED-EATING BIRDS

1, Junco; 2, White-throated Sparrow; 3, Fox Sparrow; 4, Tree Sparrow

the bird. We must learn the nature of its food at all times of year, and then strike a fair balance between its good and its bad deeds; hence the absolute necessity for the examination of the contents of birds' stomachs, by which means may be accurately determined not only the kinds of food eaten but their relative quantities. This method is exceedingly slow and laborious, requqires a high order of expert ability, and moreover is open to the very serious objection that it necessitates the taking of useful lives. So far as possible, the latter objection has been minimized by utilizing the stomachs of birds killed by naturalists for scientific purposes. This material, which otherwise would be lost to economic science, renders it unnecessary, except in special cases to destroy birds for the purpose of food examinations.

From the Biological Survey

SPARROW HAWK

Which helps the farmer by eating grasshoppers, crickets, and beetles (see page 85)

In the above connection it must not be forgotten that when a thorough examination of the food of a given species is once made and the results published, the work is done for all time. The food habits of a species having been once determined by this method, no possible excuse exists, so far as food investigations go, for further destruction of bird life; and the more so because the contents of all stomachs examined are preserved as vouchers for further verification, should that be deemed necessary.

Passing to a consideration of some of the practical problems presented, it might seem that the relation of birds to agriculture were simple, since the question is chiefly one of food. Do birds destroy crops? then of course they are injurious. Do they eat insects? then of a certainty they must be beneficial. But the problems are not to be settled in this off-hand fashion. In reality they are extremely complex and are to be understood only after much painstaking study. It has been found, for instance, that a bird may be injurious at one time and not another. In one region it may be a pest and in another an unmixed blessing. Some birds—unfortunately not many—are always beneficial. Others—fortunately not many—are always and everywhere injurious. But the great bulk of birds are both harmful and beneficial by turns, according to age, season of the year, the presence or absence of their natural food, and a variety of circumstances.

THE TREE SPARROWS VERY BENEFICIAL

For present purposes we may roughly group the bulk of our small birds into two classes — seed-eaters and insect-eaters. The seed-eaters, mostly of the sparrow family, have stout bodies and strong conical bills, expressly designed for crushing seeds. Their name is legion and the

From the Biological Survey

A USEFUL BIRD OF PREY

Swainson hawk. This bird saves the western farmer $100,000 a year (see page 85)

family contains more species than any other group of birds. It is well that this is so, for the destruction of weed seed is of tremendous importance to the farmer, whose trouble to keep ahead of the weeds, great as it is now, would be vastly increased were it not for the soberly clad and unobstrusive little sparrows. We may get an idea of the value of the service these birds render by noting what is done for the farmer by the tree-sparrow, one of the most confirmed seed-eaters of the group. A quarter of an ounce of seed per day is a safe estimate of the food of an adult tree-sparrow. On this reckoning, in a state like Iowa, where agriculture is relatively very important, tree-sparrows annually eat about 875 tons of weed seed:

The total value of the principal field crops of the United States for the year 1906 was about $3,500,000,000. If we estimate that the combined consumption of weed seed by the sparrow family results in an annual saving of only 1 per cent of the value of the crops, the sum total saved to the farmer in 1906 was $35,000,000.

Though seeds form the chief part of the subsistence of sparrows, the destruction of seeds is by no means all we have to thank these birds for. They eat many insects also, and seem to know instinctively that while seeds are excellent food for adult birds, they are not necessarily good for nestlings, and hence feed the latter almost exclusively on insects.

Sparrows, however, are not the only birds that consume the seeds of weeds. The eastern quail or bobwhite is a confirmed eater of weed seeds. Highly exteemed as bobwhite is by the epicure for food and by the sportsman as an object of pursuit, he is probably worth so much more as a weed-destroyer that the farmer can ill afford to have him shot, even though the privilege is roundly paid for. A bevy or two of quail on a farm is an asset the value of which no thrifty farmer should overlook. Doves also are seed eaters, especially the turtle-dove, whose crop often is so packed with the seeds of weeds that it can hold no more.

The farmer has no quarrel with birds that confine their attention to grass and weed seeds, and welcomes their presence always and everywhere. There are birds, however, which eat such seeds as corn, wheat, and barley, and whose place in the farmer's esteem is by no means so well assured—the crow and the blackbirds for instance. There are several kinds of blackbirds which at times attack crops as also does the crow. The destruction by the crow of meadow mice, and of cutworms and other insect pests and the destruction of many kinds of insects by the blackbirds, however, are considered in most localities to offset all damage done in other ways and even to leave a balance in favor of the birds.

From the Biological Survey

CACTUS WREN

A common desert bird of the southwestern United States

From the Biological Survey

GOLDEN EAGLE

The most widely distributed of the eagles. It ranges over most of North America and a large part of the old world. In sections of California the Golden Eagle feeds on ground squirrels and is wholly beneficial, while in some other parts of its range it feeds on lambs and wild game and is a noxious species.

BIRDS THAT EAT INSECTS

Many birds, as flycatchers, warblers, swallows, and chimney-swifts, live exclusively, or almost so, on insects, and very many more, as blackbirds, orioles, and some hawks, depend on them for a considerable part of their livelihood. The little sparrow-hawk lives very largely upon grasshoppers, crickets, and beetles, and even one of the larger hawks—the Swainson hawk of the western plains—at certain seasons destroys enough of these injurious insects, together with small rodents, to save the western farmer upwards of a hundred thousand dollars a year.

From the Biological Survey

A BARRED OWL

If all insects preyed upon vegetation, our inquiry into the value of insect-eating birds need go no further, since all of them might be set down as beneficial; but by no means all insects are destructive of vegetation, and their relations to each other and to birds are very complex and puzzling. The insects that feed on vegetation at some stage or other of their existence probably outnumber all others, both in number of species and of individuals; but there are two other classes of insects which deserve attention here, the predaceous and the parasitic. The predaceous insects, either in the adult or larval state, feed upon other insects and hence in the main are beneficial. It would seem, therefore, that in so far as birds destroy predaceous insects they do harm. That birds do destroy a greater or less number cannot be denied, but as many species of this group secrete nauseous fluids, which serve, in a measure at least, to protect them, and as many are of retiring habits and not readily found, the number destroyed by birds is relatively not large. Moreover, some of the predaceous insects, when insect food is not available, become vegetarians, and hence assume the role of enemies of the farmer; so that when birds destroy predaceous insects they may be doing the farmer either a good turn or an ill turn, according to circumstances.

The relation of birds to the so-called parasitic insects is still more intricate and puzzling. Parasitic insects fill a very important place in the economy of nature; it is even claimed by entomologists that they do more effective service in aiding to keep true the balance in the insect world than any other agency. They attack insects in every stage of existence and insure their destruction by depositing eggs on, or in, the bodies of adults, their larvæ (the worm or caterpillar stage), their pupæ, or their eggs. Now, birds recognize no fine distinctions in the insect world. All is grist that comes to the avian mill, and parasitic insects are snapped up by birds without the slightest regard to the fact that they are useful to man. Hence we have a complicated problem to unravel in respect to the interrelation of insect pests, of insect parasites that destroy them, and of birds that destroy both pests and their parasites. As Swift phrases it:

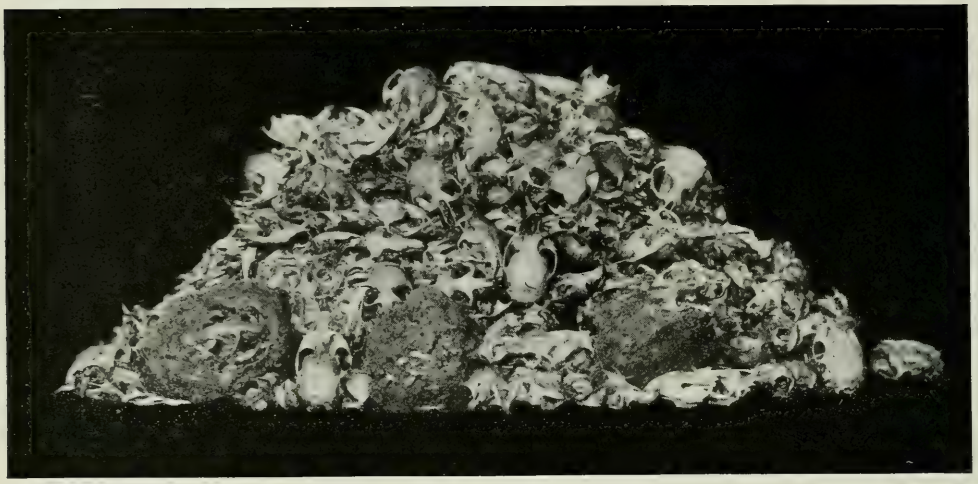


Photo from the Biological Survey

A MONUMENT TO THE INDUSTRY OF BARN OWLS

Field Mouse skulls found under owl roost in Smithsonian tower, Washington (see page 87)

So, naturalists observe, a flea
Has smaller fleas that on him prey;
And these have smaller still to bite 'em,
And so proceed *ad infinitum.*

After due recognition of the part insect parasites play in the economy of nature, it is evident that, unassisted, they are unequal to the task of keeping insect life in a proper state of equilibrium. In this work birds play an important, though it may be relatively a somewhat subordinate part. Had parasitic and predaceous insects been equal to the task of holding in check insect pests, there would be no place in the world for insect-eating birds. In the progress of evolution, however, long after insects and insect parasites appeared, birds found a place vacant, which even their reptilian ancestors had not been able to occupy, and proceeded to fill it. Having once gained a place in the world, birds entered into a competitive struggle with each other and with other insect-eaters. In the course of time they developed into a great number of families, each distinguished by peculiarities of form, plumage, and habits, and each endowed with methods of its own in the pursuit of food. That so many birds are insect-eaters is an index alike of the enormous reproductive capacity of insects and the inadequacy of the forces that warred on insects before the advent of birds.

HAWKS AND OWLS ARE NOT MARAUDERS BUT MOST BENEFICIAL

The popular idea regarding hawks and owls is that they are nothing but robbers and bold marauders. Their real character and the nature of their services to man are generally overlooked. The fact is that the great majority of our hawks and owls are beneficial, and spend the greater part of their lives in killing small rodents, most of which are always and everywhere noxious. Hawks and owls are long-lived birds, as birds go, and this fact gives a hint of their importance in the eyes of nature and of their value as servants of man.

The work of hawks and owls is complementary. All hawks are diurnal, and hunt their prey between the hours of daylight and dark. Owls, on the contrary, are chiefly nocturnal, but do much of their hunting in the early evening and morning hours, or by moonlight, and when pressed by hunger or when feeding young, they sometimes hunt by day. Hence, between them, hawks and owls

Photo from the Biological Survey

PELLETS THROWN UP BY OWLS, CONTAINING BONES AND HAIR OF MICE, NATURAL SIZE

are on duty throughout the 24 hours, and thus are enabled to prey on all kinds of rodents, large and small, those which are abroad by night as well as those active by day.

The bulk of the depredations on birds and chickens due to hawks is committed by three species—the Cooper and sharp-shinned hawks and the goshawk; and the sportsman and farmer's boy should learn to know these daring robbers by sight, so as to kill them whenever possible. The so-called "hen-hawks," usually either the red-shouldered or red-tail hawk, are too often made victims of a bad name; for while both species occasionally snatch a chicken, the habit is far too uncommon to justify the name "hen-hawk." The good these two big hawks do in the long run by destroying rats and mice far more than compensates the farmer for the insignificant damage he suffers at their talons.

CURIOUS METHODS OF DIGESTION

Both hawks and owls often swallow their prey entire or in large fragments, together with the bones, hair, and even some of the feathers. Avian digestion is both good and rapid, but it is unequal to the task of assimilating such substances, and accordingly both hawks and owls throw up these rejecta in the form of neatly rolled pellets. In studying the food habits of birds of prey much use is made of these pellets, and the vicinity of a nest of a pair of horned owls, for instance, often contains an unmistakable record of the birds' food, and perhaps that of the young, for months or even years.

From the foregoing it will at once appear that the practice of offering bounties indiscriminately for the heads of hawks and owls, as has been done by some states, is a mistake, and results not only

in the wasting of public funds, but in the destruction of valuable lives, which can be replaced, if at all, only with great difficulty and after the lapse of a term of years. In no one particular does the public, especially the sportsman and farmer, need to be educated more than in the value of hawks. The temptation to shoot a hawk or owl, perching or flying, is well nigh irresistible, and the bad habit is having the natural result of so reducing the numbers of these birds as to make it impossible for the survivors to do the work nature intended them to do. The notable increase of noxious rodents in the last decade in certain parts of the United States and the resulting damage to crops without doubt are due in no small part to the destruction of their natural enemies, chief of which are the birds of prey.

When the public is fully informed as to the value of hawks and owls and an enlightened sentiment is exerted in their behalf, they will increase in numbers and the damage to crops from noxious mammals will correspondingly diminish.

From the Biological Survey

THREE-TOED WOODPECKER
A conservator of the northern forests

THE POLICEMEN OF THE AIR

Differing widely as they do in structure and habits, birds collectively are able in man's interests to police earth, air, and water. The thrushes and other ground feeders scour the surface of the earth and hunt under leaves for hidden insects. The warblers, titmice, nuthatches, creepers, and others search among the foliage and in the crevices of bark for all manner of creeping things. The woodpeckers, a highly specialized group, perform a service no other birds are equal to, since with their specially designed chisels they dig into wood and drag forth the hidden larvæ that prey on our forest monarchs. The flycatchers from their perches dash out for their prey as it flies from bush to bush or tree to tree, while the swallows and swifts skim the air, and with intricate evolutions snap up such insects as have escaped the active search of their brethren nearer earth. The waters too and their shores have their feathered denizens which exact special tribute of the insect world.

So that, quite aside from questions of sentiment, birds must be adjudged to play an active and important part in keeping nature's balance true. Their role is all the more important, since no other creatures are fitted for their special duties. Moreover, if we may judge the future by the past, the services of birds must become increasingly valuable as time goes on. Agriculture, always important in the United States, is constantly assuming greater importance. The stream of immigration from the Old World and the steady increase of our own millions mean an ever-augmenting consumption of food at home, while the demand from abroad

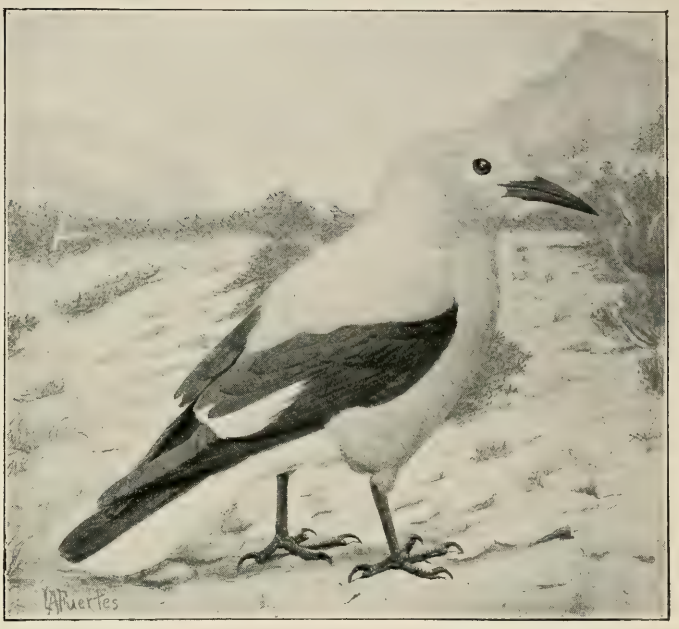
for American foodstuffs never ceases for a moment. To supply this triple demand, better methods of tillage must be devised and more and more acreage must be devoted to agriculture. In part this need of creased acreage is to be met by irrigation projects, which when they materialize will make available for farms and homes millions of acres of sterile desert.

WITHOUT BIRDS SUCCESSFUL AGRICULTURE WOULD BE IMPOSSIBLE.

But increased acreage and larger crops mean a vast increase of insect life as the result of a more constant and abundant supply of food. Even now, despite the incessant warfare waged against them, insects are not diminishing in numbers. On the contrary, in many localities they are increasing. Especially are new pests finding their way into the country, and as these usually are unaccompanied by the enemies which keep them in check at home, they frequently run riot in the new- these usually are unaccompanied by the enemies which keep them in check at home, they frequently run riot in the new-found Paradise. Well-known instances are the cotton boll weevil and the gypsy and brown-tailed moths. It is estimated by entomologists that the annual loss of agricultural products from insect ravages in the United States is not less than $500,000,000. To birds, then, we must look for allies in the continuous warfare against insect pests, and if they are to play even the same relative part in the future as they have in the past, they should not only be protected, but determined efforts should be made to increase their numbers and make their work more effective.

What would happen were birds exterminated no one can foretell with absolute certainty, but it is more than likely—nay, it is almost certain—that within a limited time not only would successful agriculture become impossible, but the destruction of the greater part of vegetation would follow. It is believed that a permanent reduction in the numbers of our birds, even if no species are actually exterminated, will inevitably be followed by disastrous consequences.

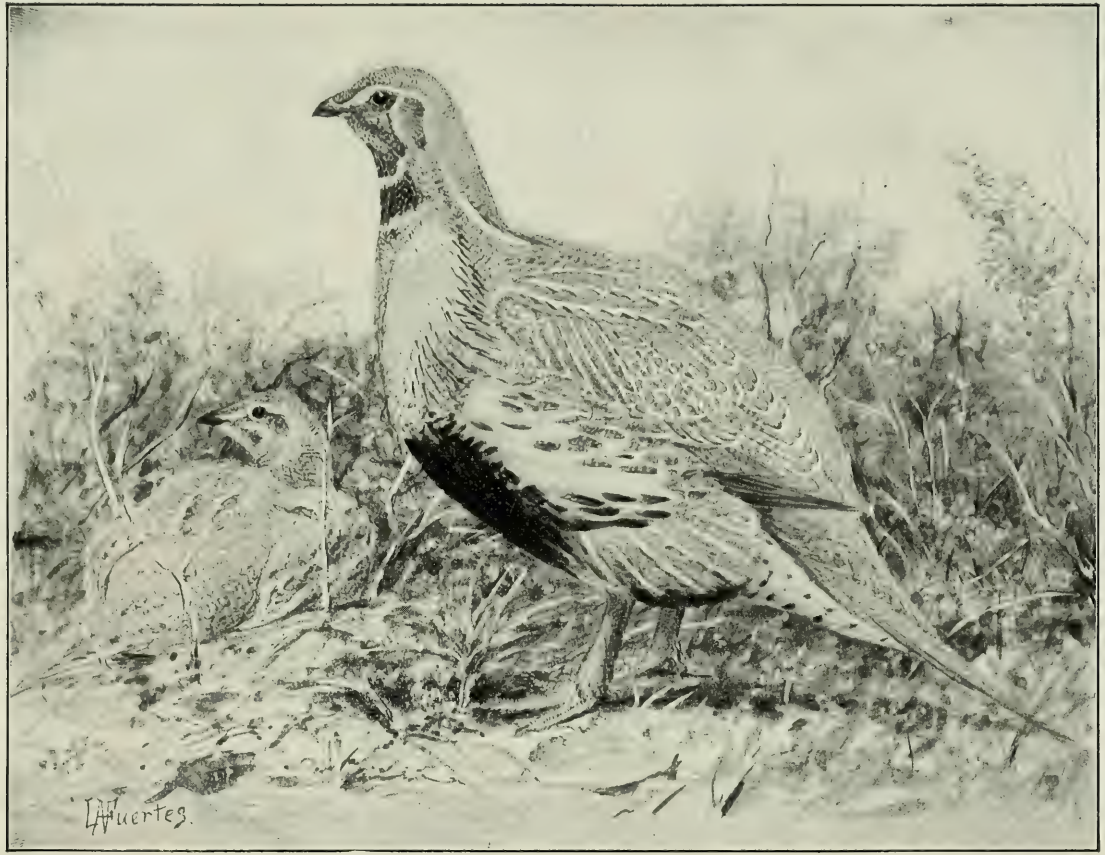
The strict enforcement of bird-protection laws is the more important, since of recent years thousands of immigrants from the south of Europe have reached our shores who appear to be wholly ignorant of the value of birds to man except for food, and who exhibit a total disregard for the spirit of bird laws, and little for the letter, except in so far as infraction brings sure and swift punishment. In the eyes of many of these recent comers, no bird is too small to serve as food; no bird too valuable to serve as a mark for the gun. Birds' songs have



From the Biological Survey

CLARK CROW

A bird of the high pine forests in the Rocky mountains



From the Biological Survey

SAGE HEN

Our largest grouse; resident on the sage brush plains of the western United States

no purpose in their ears but to indicate the whereabouts of their victims. Hunting small birds with them is a passion. Unless speedy cognizance is taken of the tendencies of this rapidly increasing class of immigrants, some of our most valuable song and insect-eating birds will be in danger of extermination.

It should arouse a feeling of pride in Americans that our Republic has taken a foremost place among the nations that care for and protect birds. Much has already been accomplished in this country in the cause of bird protection, but much still remains to be done. So long as dead birds for hat gear are valued at a higher rate than living birds, and so long as game birds count for more in the way of sport and food than as active working friends of the farmer, so long will there be missionary work to do for such organizations as the Biological Survey and Audubon Societies.

MANY OF THE SMALL MAMMALS BECOME PESTS

The relations of mammals to agriculture are very different from those of birds. Most birds, as has been shown, are beneficial, even those with injurious habits, as a rule, compensating in whole or in part for the damage they do. Such is by no means the case with mammals. As a result of the investigations of the Biological Survey, some of our common mammals indeed have been found to perform valuable service to man. To this class belong the bats, moles, and shrews, which are insectivorous; the badger, which is an indefatigable mouser when it cannot find larger game in the shape of prairie dogs and similar rodents; and the skunks and weasels, which destroy vast numbers of insects as well as mice. The fox, wild-cat, ring-tailed civet, and opossum also are believed to be useful in the main, as they eat many insects and small rodents and by no means destroy as much game as is popularly supposed. Reynard's raids on the poultry yard are not common, and they are so easily guarded against that they should count but little in the scale against him. Even coyotes when they follow their natural bent perform an important service—they keep down the number of rabbits, which constitute their natural prey. Unfortunately, however, the coyote early contracted a taste for mutton, and in some regions successful sheep-raising is practically impossible because of its destructive raids. Experiments are being made by the Biological Survey and Forest Service to discover a cheap method of fencing by means of which depredations on sheep may be prevented. Effective fencing of sheep against coyotes will compel these animals once more to rely for food chiefly on rabbits, prairie dogs, and other destructive rodents.

When all has been said, however, the list of our wild mammals that are of essential service to man is comparatively small, even if we include in it a number which are harmful and beneficial by turns, like minks, coyotes, foxes, and others, compared to the army that are always and everywhere injurious.

WOLVES CAUSE MILLIONS OF DOLLARS OF LOSS YEARLY

It was predicted that the extermination of the buffalo would be followed by that of the big wolf, so intimately associated were the two in the days when the wolf used to prey on the young, the aged, and the crippled buffalo; and for a time after our largest native mammal succumbed to the robe-hunter it seemed as if the prediction was likely to be fulfilled, so scarce did wolves become. But the old buffalo ranges soon filled with cattle, and the wolf took on a new lease of life, and in some localities now threatens to become as numerous as in former times. The value of the cattle destroyed annually by wolves amounts to millions of dollars, and this despite the payment of large sums as bounty for wolf scalps. After investigation the Biological Survey has recommended measures which it is believed will prevent the greater part of the damage. The most important of these are the systematic use of poison and the destruction of the wolf pups in the breeding

From the Biological Survey

THE RING-TAILED CIVET CAT OF THE SOUTHWESTERN UNITED STATES

A first-class mouser

dens. Wolves breed early in the year, and when snow is on the ground may be tracked to their dens with absolute certainty. Even when the ground is bare, a skillful tracker, familiar with the country and with the habits of the animal, can usually locate the dens. By destroying the increase and by the judicious use of poison to insure the death of the old ones, several millions of dollars may be saved to the stockmen annually even now, while the measures recommended, if energetically and persistently followed up, are likely to result in the practical extermination of these savage pests.

RATS AND MICE ARE OUR MOST DREADED ENEMIES

But the damage by wolves, panthers, coyotes, and all the carnivores put together does not begin to equal the destruction wrought by the army of small rodents, individually insignificant but collectively a mighty pest. Rats alone do an almost incalculable amount of harm in the United States, and everywhere they are deservedly dreaded, all the more since by long contact and constant conflict with man they have become extremely sagacious and wary, and thus far have been able to defy his utmost efforts

From the Biological Survey

TEXAS WILD CAT
An active foe of noxious rodents

to exterminate them, or even to seriously reduce their numbers, and as if the measure of their iniquity were not filled by the wholesale destruction of merchandise, household goods and foodstuffs, they are now known to serve as carriers and disseminators of that dread disease, the plague; so that measures to exterminate them, wherever that is possible, are doubly important.

When is added to the total damage done by rats the results of depredations by meadow and house mice, by prairie dogs, rabbits, gophers, ground squirrels, and other small gnawing animals, the resulting total, could it be ascertained, would stagger belief. Unfortunately accurate statistics of such damages are for the most part wanting, but a single item is suggestive. One of the small ground

Photo by Viola McColm

NOT DEAD, BUT PLAYING POSSUM

squirrels of Washington injures the wheat crop in a single county of that State to the extent of half a million dollars annually. While the loss to this country by rodents by no means equals that caused by insects, the total reaches far into the millions and is a serious drain on the national resources.

To devise methods of combating these pests, of reducing their numbers, and, if possible, of accomplishing their extermination is one of the important problems dealt with by the Biological Survey. By the use of traps, of poisoned foods, and of gases to kill the animals in their burrows, much has been accomplished. Failure to secure the utmost results aimed at by these methods is due chiefly to the difficulty of securing the coöperation of all the farmers in an infested region. It is evident that if a number of landholders withhold their aid, their farms become nurseries from which to repopulate adjoining districts. Moreover, in most regions there are sterile and unproductive areas which receive no attention, and these again are harbors of refuge for the pests which later emerge to restock farming lands. Hence the contest appears to be a never-ending one, and is a constant source of loss and annoyance to the farmer.

The difficulties of warfare against rodents are in inverse proportion to the settlement of the country. Where farms are large and there is much waste land, the difficulties are very great; but when farms are comparatively small and there is little unoccupied land, coöperation between landholders is easier to secure and results are more encouraging. In parts of Kansas, for instance, where formerly farming population was scarce and prairie dogs numerous and destructive, the animals have been practically exterminated as the result of the continued effort of numerous ranchers working together for a common end and aided by the state.

In attempting to devise more effective means of abating rodent pests the attention of the Survey has been turned to a

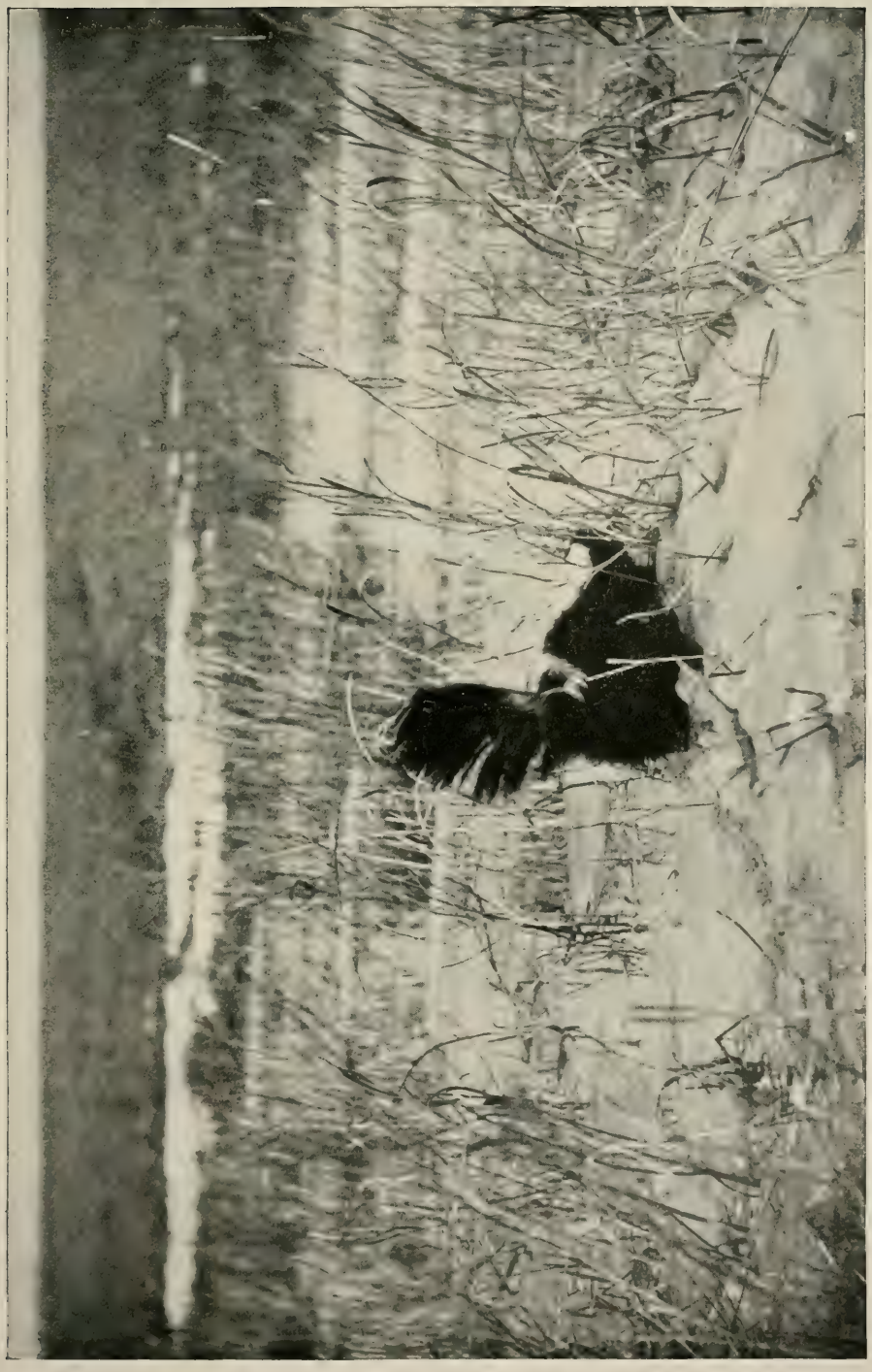


Photo by Viola McColm

COMMON SKUNK WADING THROUGH SLUSH—KANSAS

Photo by Bailey, Biological Survey

GRAY FOX—NEW MEXICO

study of the use of epidemic diseases—nature's own method of destroying surplus population. It has long been known that at irregular intervals, when mammals, especially rodents, that live in crowded communities increase till they are very numerous, they are suddenly smitten with an epidemic which almost wipes out the species over a considerable area. In the case of such epidemics a certain number of individuals either are immune to the disease or recover from it; for while nature is prodigal with the lives of individuals and wastes them with apparent recklessness, she cherishes the species and is chary of exposing one to the risk of elimination. After a few years the animal that has paid the price of too great prosperity again multiplies beyond limits, to be again reduced.

Efforts are now being made to obtain cultures of the diseases which prevail among the more destructive of our rodents, so that they may be employed in other regions where the animals are pests. Since the cultures may be renewed from time to time, they can be kept indefinitely and be ready for use as required. If they prove as effective as when employed by nature, the problem of a cheap and reliable method of dealing with destructive rodents will have been solved.

FOX FARMING

Time was when it might almost have been said that America furnished furs for the world, and even now no inconsiderable part of the fur harvest comes from America. Year by year, however, the harvest is diminishing, while the price of furs is steadily advancing, till the finer and rarer kinds are within the reach of only the very wealthy. Foxes of the more valuable kinds, for instance, once so numerous in this country, are now comparatively scarce. Their fur is so valuable and so much sought for that, instead of trying to discover means to compass their destruction, the Survey is now studying the best methods of fox farming, with a view to making the breeding of the

TYPICAL BREEDING GROUNDS OF COYOTES IN WESTERN WYOMING

Photos by Bailey, Biological Survey

COYOTE PUPS AT MOUTH OF BREEDING DEN IN WYOMING

A family of coyote pups was found in the hole near cross on extreme right

Photo by Bailey, Biological Survey

A MUTE WITNESS TO THE DESTRUCTIVENESS OF MICHIGAN WOLVES—BODY OF DEER LYING ON THE SNOW

animal in confinement not only possible but remunerative. When silver fox skins are worth from $300 to $600 a skin it does not need a Colonel Sellers to see golden possibilities in the business.

The raising of mink and beaver, and perhaps otter, for their fur is also thought to be entirely feasible. The beaver is being protected in Canada and in some of our own states. It should be protected in all, for apparently protection is all that is required to enable the animal to reëstablish itself in many of its old haunts. After being safeguarded for a term of years, judicious trapping might then be allowed, and thus this remarkable and valuable fur-bearer be preserved indefinitely, to be a source of both interest and profit to future generations. Even the despised skunk, which is easily cared for and is wonderfully prolific, can, it is believed, be raised in confinement with profit.

The idea of raising furs for the market is by no means new. Many attempts have been made to breed foxes for profit, especially in certain islands of Alaska, where the conditions would seem to be ideal. Some of the ventures appear to have proved remunerative, but many failures have resulted, chiefly as the result of inexperience and lack of knowledge, especially of the proper feeding and care of the animals. It is thought that the difficulties are by no means insuperable and that they can be overcome by study and carefully conducted experiments.

Thus the ends sought by the Biological Survey in its investigations of mammals differ considerably from those aimed at in its study of birds. The more carefully birds' habits are studied and their food investigated, the more apparent is it that man cannot do without them. Such is by no means true of many of our indigenous mammals. Some are valuable because they destroy noxious insects and noxious mammals; others because they furnish skins for use and comfort; but many are wholly noxious, or so nearly so that they can be safely classed as such, and their destruction compassed in every possible way, though always with the entailment of as little suffering as possible.

APPLE TREE KILLED BY RABBITS

Photos from the Biological Survey

APPLE TREE KILLED BY FIELD MICE

Photo from the Biological Survey

PRAIRIE DOGS AT MOUTH OF BURROW

LIFE AND CROP ZONES

It has long been recognized that plants and animals are not distributed fortuitously over the earth, but in their distribution are governed by well-defined laws. Certain species and groups of species are restricted to certain regions because of peculiarities of climate, temperature, and soil, summed up under the word environment, essential to their well being.

Cultivated plants are wild plants tamed—wild plants modified to some extent by care and cultivation—but in their nature and all essentials akin to their uncultivated ancestors. To a great extent, then, the laws of distribution that apply to wild plants and animals apply equally well to cultivated varieties. The ready application of these facts will appear from an example. If on a certain mountain side a particular crop is found to thrive, and the observer happens to know the particular plants, birds, and mammals natural to the locality, when he visits a different region where the same plants and animals find a congenial home he may be sure that the crop in question will thrive there also.

Such being the case, it was early perceived that a study of the distribution of wild plants and animals and the mapping of the natural areas of distribution could be made to serve a practical use, whereby the farmer would be saved enormous expense in experiments to ascertain the particular crops adapted to new localities. Accordingly, in the summer of 1889 Merriam selected the San Francisco mountain region of Arizona for an experimental survey, and it is not too much to say that the results of the work there revolutionized prevailing conceptions of the principles of geographic distribution.

In ascending the mountain a succession of climatic belts were traversed, similar to the ones to be noted in traveling from our southern boundaries to the Arctic, each zone or belt being characterized by a distinct set of animals and plants.

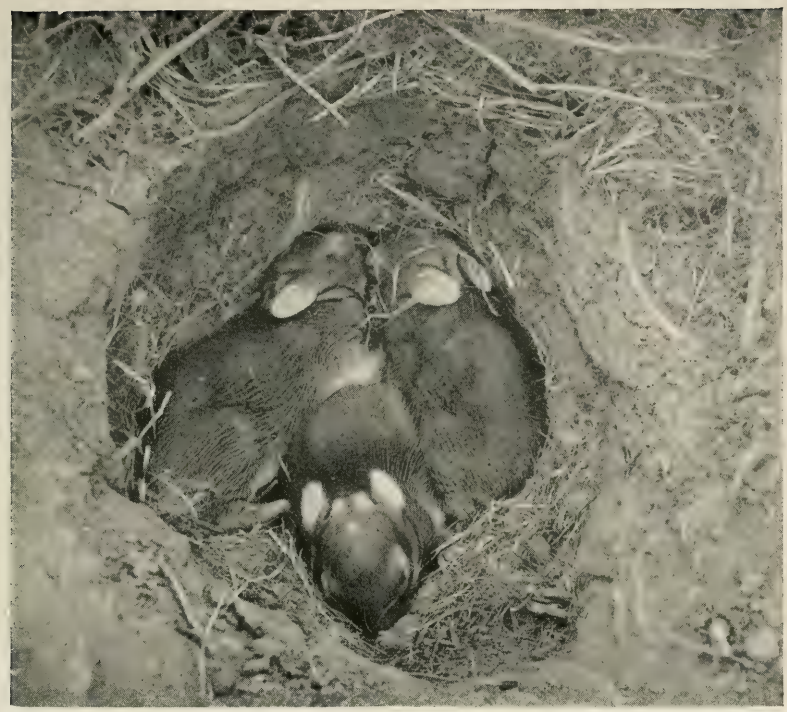


Photo by Viola McColm

VERY YOUNG COTTONTAIL RABBITS IN NEST

Among other results it was demonstrated that the laws governing the distribution of mammals, birds, reptiles, insects, and plants are essentially the same. Hence a map showing the boundaries of an area inhabited by an association of species of one group serves equally well for the other groups. Comparison of the facts of distribution as noted on this mountain with corresponding facts over the country at large disclosed three important truths: (*a*) That the several life zones of the mountain could be correlated with corresponding zones long recognized in the eastern United States; (*b*) that these same zones are really of transcontinental extent, though never before recognized in the West; and (*c*) that the faunas and floras of North America as a whole, and, for that matter, of the Northern Hemisphere north of the tropical region, are properly divisible into but two primary life regions—a northern, or Boreal, and a southern, or Austral (then termed Sonoran), both stretching across the continent from ocean to ocean.

Subsequently a careful study of the geographic distribution of plants and animals was undertaken, to include the whole of the United States and, where necessary, the region contiguous.*

The practical use of zone maps is easily understood. If, for instance, it is ascertained that a certain crop thrives in one part of a particular zone, it is to be expected that elsewhere within the zone, where similar local conditions prevail, the same or a closely allied crop will do well. As each zone includes thousands of square miles, the value of such information is obvious.

The final step toward making such

* The first announcement of the laws of temperature control of the geographical distribution of terrestrial animals and plants was made in this Magazine, vol. VI, 1894.

Photo by E. R. Warren

FIELD MOUSE

When numerous field mice do enormous damage to crops (see page 92)

zone maps of the utmost practical use—and a very important one—is to accompany the maps with a list of the fruits, grains, and vegetables best suited to each zone. Thus the necessary experimentation on the part of the farmer is reduced to a minimum. The farmer who wishes to find land where a certain crop may be planted with success, or the emigrant in search of conditions similar to those he is familiar with at home, has only to refer to the zone maps and to the lists connected therewith.

A small scale zone map of the United States has been completed, with lists of the farm products most likely to thrive in the several belts. While for general purposes this map is very useful, it is by no means detailed enough to give all the information the farmer or emigrant in search of a new location desires. It is the present purpose to survey each important agricultural state with sufficient detail to enable life and crop zone maps to be published, with lists of the crops specially adapted to the several parts of the respective states.

Such crop and zone maps are useful in still another field. At the present time the whole world is being searched by specialists for fruits and plants, suited to the conditions that prevail in our own country. The usefulness of such maps as a guide to the most favorable localities in which to test the value of these foreign importations can hardly be overestimated.

Noxious insects also in their dispersal over the country follow the same faunal belts, as do also many of the diseases of domestic stock and even of man. Yellow fever, the germs of which are now known to be distributed by a mosquito, has been shown to be limited to a transcontinental belt the boundaries of which were laid down by the Survey nearly twenty years ago.

Curiously enough the regions formerly occupied by particular tribes of Indians correspond in a general way with these same life zones, as was pointed out by

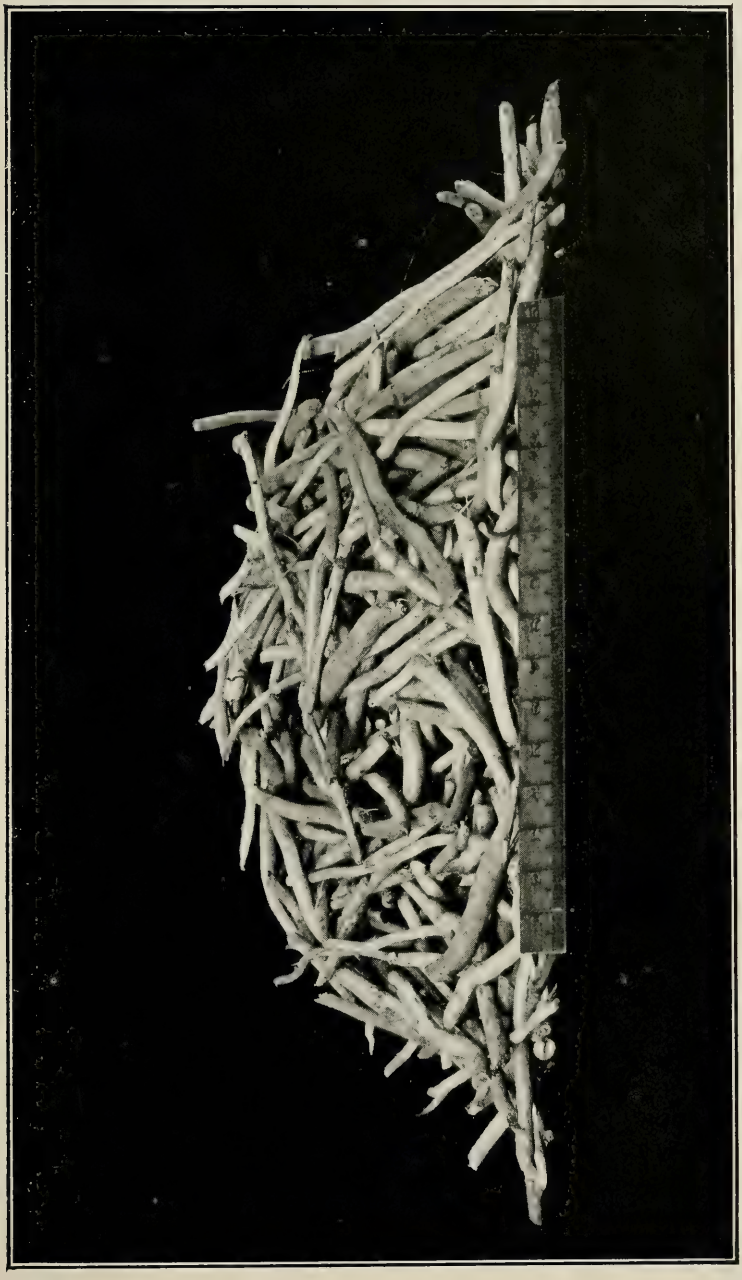


Photo from the Biological Survey

SECTIONS OF MORNING GLORY ROOTS STORED BY FIELD MOUSE FOR WINTER FOOD SUPPLY

From burrow on Potomac Flats

Photo by Osgood, Biological Survey

SHELTER-HOUSE ON FOX FARM IN MAINE

Merriam. The Indian was largely dependent for his livelihood upon the natural fruits of the earth and upon game, in the same way, though not to the same extent, as were wild animals. Thus the distribution of acorns, camas, pine seeds, wild oats, and the thousand other wild crops, as well as that of the birds and animals which furnished them food and raiment, to a great extent determined the favorite haunts of the aborigines of this continent.

GAME PROTECTION AND KINDRED SUBJECTS

What a glorious heritage of game, both bird and beast, was bequeathed by the Indians to our forebears, and with what prodigality has it been wasted by them and by ourselves! Neither motives of humanity nor far-sighted prescience deterred the Indian from wanton slaughter of game. He killed animals and birds, however, not for sport, but for food, shelter, and raiment, and the very abundance of game and his imperfect weapons made game laws restrictive measures in his time as unnecessary as they were undreamed of.

Very different are present-day conditions. Of the almost infinite number of game birds and animals that once filled our mountains and valleys only a small remnant is left. The buffalo, that ranged from the Atlantic to beyond the Rocky Mountains and blackened the plains with its countless numbers, is practically extinct in its wild state; the antelope, bands of which everywhere dotted the plains, is rapidly approaching the same fate; moose and caribou, though still occurring over much of their former range, are being greatly reduced in numbers; while elk, deer, and mountain sheep are quite unknown over much of the territory they formerly inhabited. Our game birds are facing the same fate. The present generation knows not the wild pigeon, flocks of which used to darken the sun as they swept across country. The various

Photo by Bailey, Biological Survey

ASPEN BEING FELLED BY BEAVER—NOTE SIZE OF CHIPS

Photo by Bailey, Biological Survey

BEAVER DAM FROM BELOW—NOTE STORAGE POND ABOVE DAM

The beaver is a natural ally of the reclamation engineer

Photo from Mrs Charles Shaffer

HUDSON BAY SABLE

One of the most valuable American fur bearers

species of grouse and quail have been decimated in many regions till only a beggarly remnant remains, and even ducks and geese, that with the changing seasons once thronged our tidal waters and waterways, have been so mercilessly slaughtered that the future prospects of more than one species looks dark. All of our waders have been reduced in numbers and many are almost unknown where formerly they used to cover the sand and mud flats. Such facts sufficiently empasize the need of game protection, and the study of ways and means of preserving such of our game birds and animals as still survive is regarded as one of the pressing duties of the Biological Survey.

We Americans did not at first welcome the idea of close seasons, license systems, game refuges, game wardens, and the other measures necessary for the protection of wild life. To our forefathers of not long ago the privilege of killing game when needed was an absolute necessity, and we have been so long accustomed to the idea that game is public property, to be appropriated by the first comer, that we do not take kindly to restrictions of any sort. Nevertheless both the theory and practice of game and bird protection are now firmly rooted in this country,

By courtesy of the *Pacific Monthly*

ORANGE GROVES OF SOUTHERN CALIFORNIA

In climbing the mountains in the background one traverses in succession all the life zones from the orange belt (Lower Sonoran zone) to the frigid treeless summit (Alpine zone)

simply because of the self-evident fact that without at least a measure of protection there will soon be no game left. No duty can be plainer than to so care for our game animals that the species may be perpetuated for the pleasure and use of future generations. We cannot indeed pass on in full measure the heirloom we received, but many of our finest game birds and animals still survive, to insure a future supply, provided we refrain from wanton slaughter and protect both wisely and well. The theory that wild game is not and cannot be made the property of the individual, but that it belongs to the state, which has the power to regulate its use and preservation, is now recognized almost everywhere, and the recognition of this principle has greatly aided the cause of game protection.

As the supply of native game birds diminishes, there appears to be a growing tendency among sportsmen to import birds from foreign countries for restocking covers, and the Survey is constantly in receipt of requests for information on this subject. European partridges, capercailzie, black game, willow and hazel grouse, and several kinds of pheasants have already been experimented with. It is yet too soon to decide as to the ultimate outcome of most of these efforts, but in the West, especially in Oregon and Washington, the introduction of pheasants has been successful, and in certain localities two species of these superb game birds are very numerous. In parts of the Atlantic States also they have been successfully acclimatized.

Should it prove, as now appears probable, that along with pheasants and other

foreign game birds diseases have been introduced which threaten the safety of our own native game birds, sportsmen may conclude that by the importation of foreign species they have lost more than they have gained.

As most birds, including ducks and geese, are migratory and do not breed in the states through which they pass in spring and fall, many now advocate measures placing all migratory birds under federal control. The present diversity of state laws and the wide differences in the dates of their open and close seasons are the chief arguments for delegating the care of migrants to central authority. That the effect of such a measure would be to improve existing conditions and extend the lease of life to many species of ducks and shore birds now fast approaching extinction can hardly be doubted.

BIG-GAME REFUGES

The use of government reservations for the preservation of wild animals in danger of extinction is a practical form of protection which cannot be too highly commended. The experiment on a large scale was first tried in Yellowstone Park, and the results there have been most encouraging. Despite some poaching, elk, antelope, and mountain sheep have steadily increased in numbers, while buffalo also have thriven wonderfully.

The high price paid for elks' teeth is a constant temptation to lawless hunters to kill these superb animals. It is to be hoped that the organization chiefly responsible for this demand will by official action repudiate elks' teeth as a necessary emblem of the order, and thus lend material assistance in the effort to preserve this, the noblest of our game animals.

It is a pleasure to note that the cooperation of private parties with the government authorities in efforts to perpetuate our game animals are not wanting. An instance in point is Miller and Lux's generous offer to the government of their herd of elk on the Button Willow Ranch, California. In 1905, under the direction of the Biological Survey, some 20 of these animals were successfully transferred to the Sequoia National Park, in Tulare County, where they promise to form the nucleus of a large herd of this fine species.

The New York Zoölogical Society is also actively interested in the preservation of our big game. Through its generous coöperation, the Wichita Game Preserve in Oklahoma has become the permanent home of a herd of buffalo. The animals are confined to a suitable area by means of a strong fence, and, as the preserve is in the midst of their former range, the success of the experiment would seem to be assured. Under what appear to be ideal conditions, the herd is likely to increase notably, so that in time it will be possible, if desired, to stock other reserves from the surplus.

13 BIRD RESERVATIONS

The theory of the bird reservation is nearly akin to that of the game refuge. Formerly our coast teemed with bird life, which consisted not only of migrants from the far north, but of summer residents, which found the rocky and sandy islets of our shores a very birds' paradise. The rage for hat birds changed all this and converted most of the former bird resorts into solitudes, so far as bird life is concerned. By setting aside here and there an island of no particular use for other purposes, the government has established nurseries and winter resorts where sea birds undisturbed may rear their young and find shelter. The plan has the energetic coöperation of the National Audubon Society, which has established island reserves of its own, and whose good work in this and other fields cannot be too highly extolled. The results attained are exceedingly satisfactory, and thousands of gulls, terns, pelicans, and other sea birds are reared each year in these bird resorts. Pelican Island is likely to become one of the sights of Florida, and already many tourists have sought permission to visit

ELK IN DEEP SNOW, YELLOWSTONE PARK

Photo by F. J. Haynes

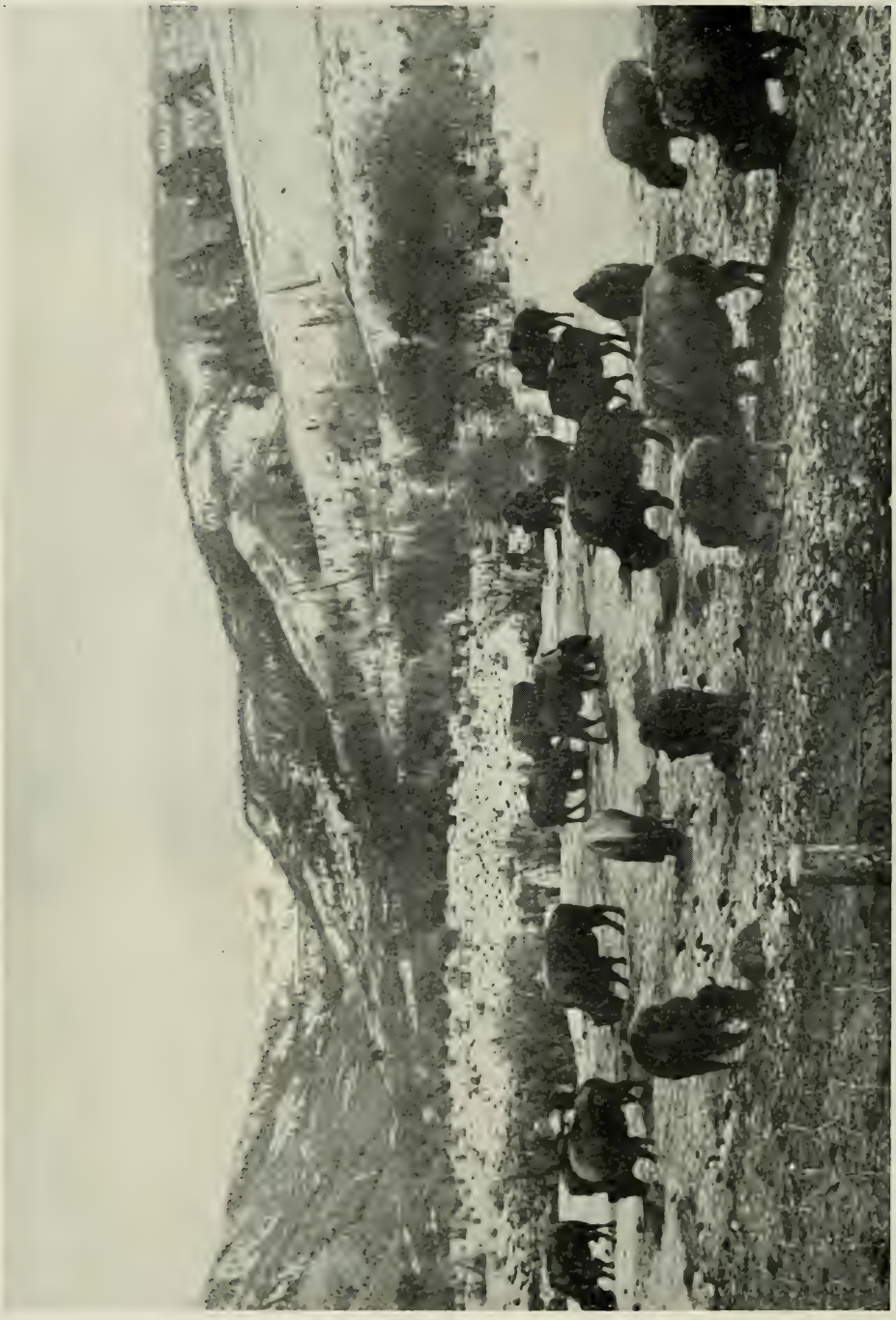


Photo by F. J. Haynes

BUFFALO IN YELLOWSTONE PARK

TWIN BLACK BEAR CUBS—YELLOWSTONE PARK

Photo by F. J. Haynes

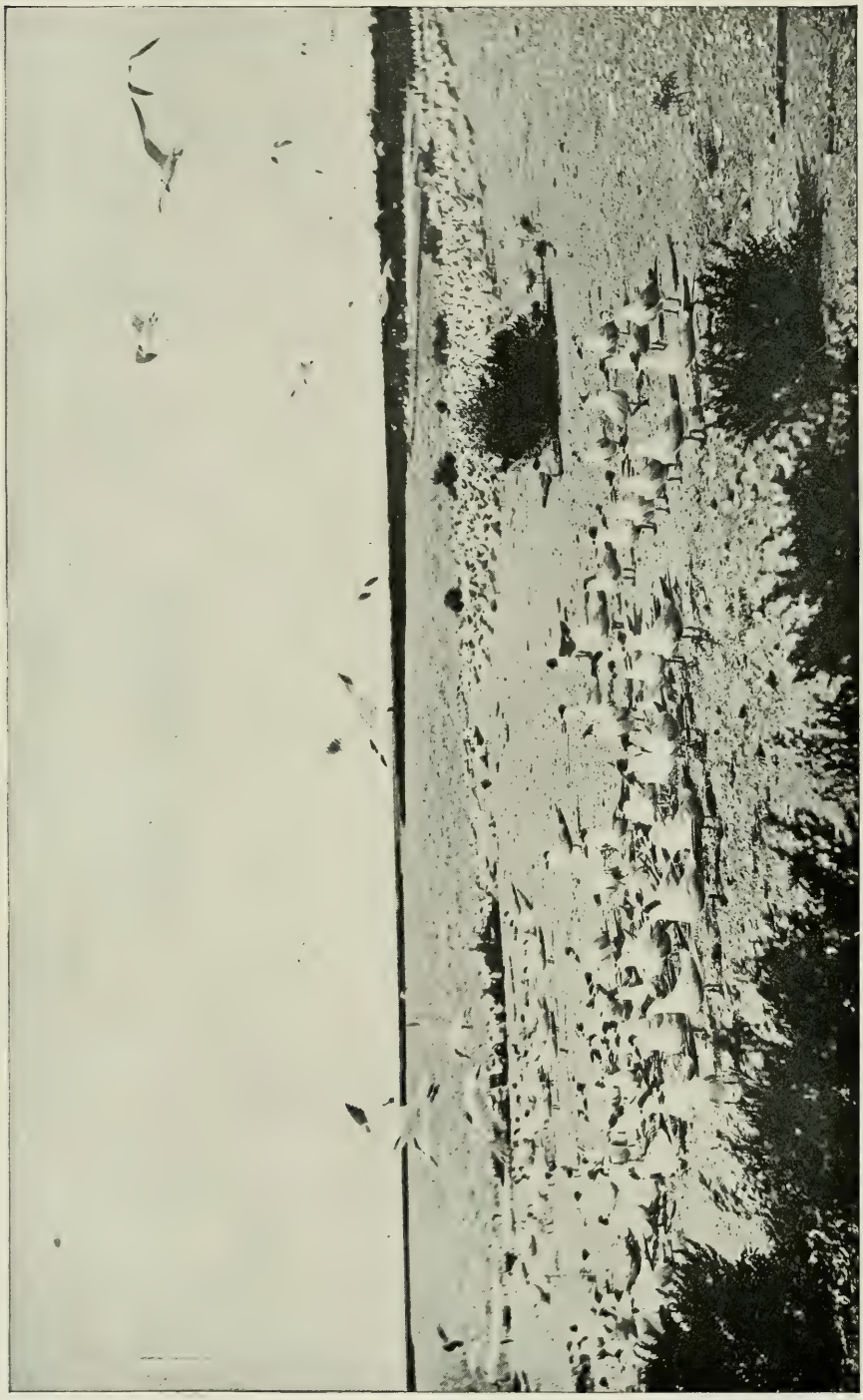


Photo by Frank Miller, July, 1907

ROYAL TERNS BREEDING ON BATTLEDORE ISLAND, COAST OF LOUISIANA—AUDUBON RESERVATION

Photo by F. M. Chapman

A BROWN PELICAN COLONY, PELICAN ISLAND RESERVATION, FLORIDA

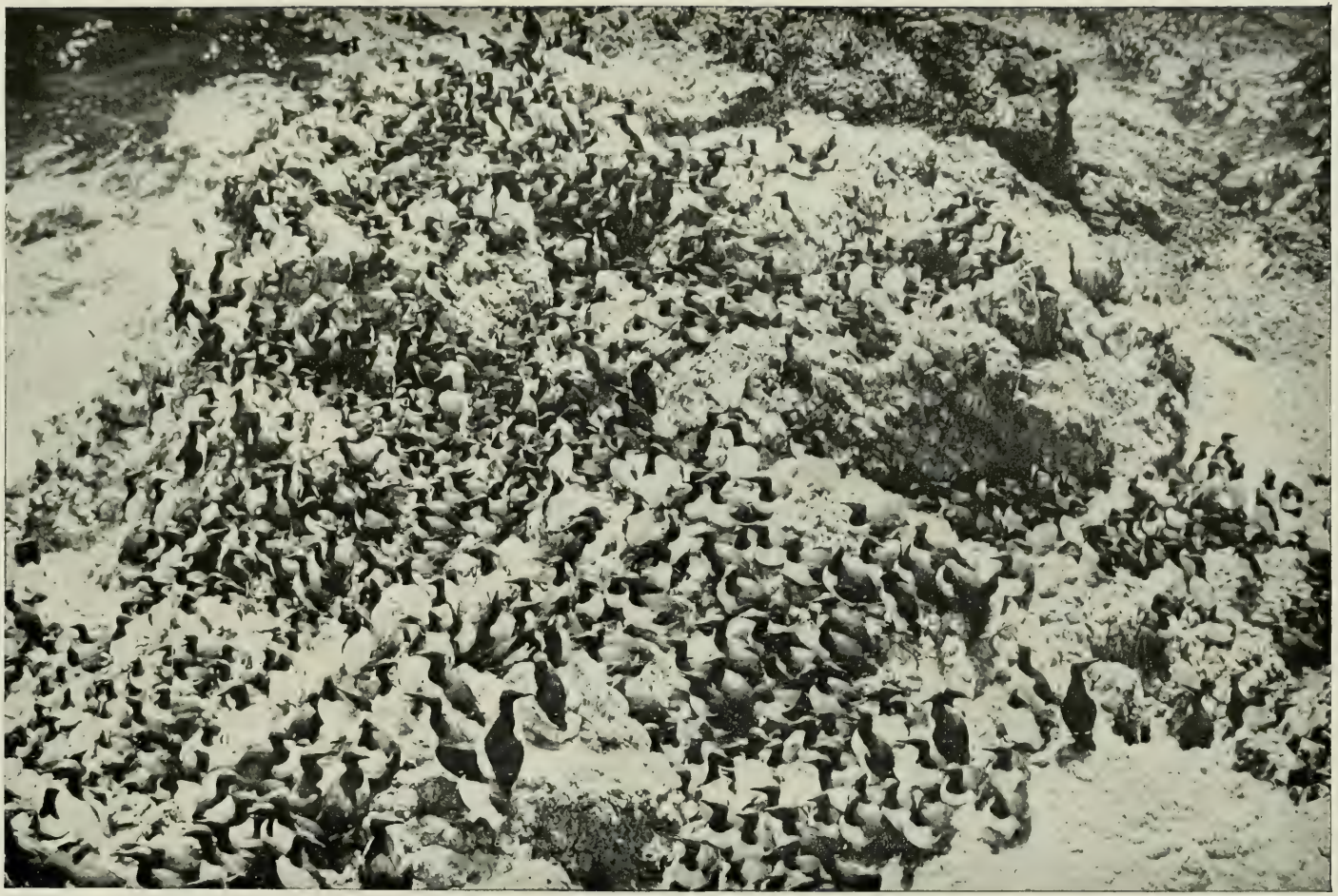


Photo by Finley and Bohlman

CALIFORNIA MURRES ON THREE ARCH ROCKS, OFF THE OREGON COAST

One of the reservations recently made by order of the President to protect the breeding grounds of sea fowls

Photo by Finley and Bohlman

CORMORANTS NESTING ON THREE ARCH ROCKS BIRD RESERVATION, COAST OF OREGON

YOUNG CORMORANTS, DEVIL'S LAKE, NORTH DAKOTA

Photo by D. Lange

it to view the ungainly but interesting birds attending to their domestic duties.

As a final result of the establishment of bird refuges, there is every reason to believe not only that these island bird colonies will be maintained intact, but that in time the birds will so multiply as to restock other islands not under the control of specially appointed wardens. Thus far 13 reservations have been set apart by the Government: Breton Island, Louisiana; Pelican Island, Passage Key, and Indian Key, Florida; Stump Lake, North Dakota; Huron Islands, off the south shore of Lake Superior, Michigan; Siskiwit Islands, south of Isle Royale, Lake Superior; and a series of islands off the coast of Oregon and Washington.

PROTECTION OF GAME IN ALASKA

The big game of the world is fast being killed off. Nowadays no region is too wild or remote to attract the sportsman and the trophy hunter. Those who read the accounts of the African explorers of scarcely more than a generation ago never dreamed that in a short time the vast herds of wild game over the greater part of that continent would be a thing of the past. Alaska has now become the Mecca toward which the eyes of sportsmen are longingly turned, and were all restrictions on the export of trophies from that territory removed, a very short period would suffice to see the end of several notable game animals. The Kenai Peninsula contains the largest of the deer tribe in the world, the big Kenai moose, and horns of one of these animals, which sometimes spread 74 inches or more, command fabulous prices. Other Alaska game animals are greatly prized by sportsmen for trophies.

In a territory so remote from supplies as Alaska, game possesses more than ordinary value to its inhabitants, and the primary purpose of the Alaska game law was to preserve the game for the use of the people, both natives and white. To provide for emergencies, a special clause in the present law allows Indians, Eskimos, miners, and explorers, when in need of food or clothing, to kill game for their immediate use. Prior to the passage of the law, so many deer were killed for their hides as to threaten the extinction of these animals within accessible territory.

The law has been thought by many too drastic, and has caused much dissatisfaction.

A bill was introduced in the 59th Congress, and passed the House, which materially modifies the present law and is very liberal with regard to the shipment of trophies. It provides, among other things, for the issuing of licenses to hunt and to export a limited number of trophies and for the employment of game wardens and guides. Should this bill become a law, many of the present causes of complaint on the part of sportsmen and residents of Alaska will be removed.

THE LACEY ACT

The so-called Lacey act, approved May 25, 1900, marked a long and important step forward in the cause of bird and game protection. Prior to its passage the several states attempted in vain to prohibit the shipment of game beyond their boundaries. Game was forwarded to other states and sold in distant markets, without respect to season, under the plea that by such shipment it had become an article of interstate commerce and hence was beyond the jurisdiction of the state where offered for sale. All this was changed by the Lacey act, which struck at the root of the evil by prohibiting the shipment from any state of birds killed in violation of local laws, and placed imported game on the same footing as birds or animals produced within the state where the game was sold.

This act confers upon the Department of Agriculture important powers also in relation to the importation of foreign birds and animals, which prior to its passage was without check. It specifically prohibits the introduction of certain species, such as the English sparrow, starling, flying-fox, mongoose, and such others as may be declared injurious to agriculture; for with the growth of our

commerce the danger of the introduction of noxious birds, mammals, and insects is ever present. To prevent the introduction of birds and mammals likely to become pests is one of the special duties of the Biological Survey.

GUARDING AGAINST DANGEROUS IMPORTATIONS

The English sparrow serves as an ever-ready example of the disastrous consequences of the unwise introduction of a species into a new home. Under the present law and system of inspection, this pest could never have obtained a foothold in America, since so well known were the bird's habits in its native land that its disastrous career on this continent would have been foreseen and its entry prohibited.

Under the mistaken idea that the mongoose would prove beneficial by devoting itself to the destruction of small rodents, and ignorant of the fact that the animal is omnivorous and one of the most destructive creatures in existence, more than one attempt has been made to import it into the United States, where its successful introduction would prove nothing less than a national calamity.

Attempts to bring in numerous noxious birds and beasts have been frustrated only by the vigilance of the inspectors. It is, however, necessary to guard not only against intentional importation of noxious species from mistaken philanthropic motives, but unintentional ones; and when it is understood that under the 433 permits issued last year for the entry of foreign birds and animals were included 274,914 canaries, 47,383 miscellaneous birds, and 654 mammals, it will be seen that mistakes of identity by importers might easily be made, and that under the guise of innocent species noxious ones might find entrance. Every shipment of birds or beasts, therefore, is carefully scanned by expert agents, who seize upon noxious species and prevent their entry into the country by compelling their destruction or their return to the port of shipment. The Lacey act is not intended to restrict legitimate trade or work undue hardship on importers. In the great majority of cases it can be enforced so as to cause only slight delay and yet prevent the entry of species which may become pests.

As will appear from this short sketch, the work of the Biological Survey is eminently practical in its nature and intent. Beginning with investigations of the food habits of a few of our most important birds, the scope of its work has widened until it involves the study of all our birds and mammals in their manifold relations to man. The essential objects of this branch of the work are to show from a basis of ascertained fact the particular species that are beneficial and those that are injurious, and to indicate the best methods of preserving the one class and of destroying the other. Incidental to its main object, it endeavors to collect and to supply to those interested all available information relative to the distribution and abundance of our game and of our birds and mammals. Its list of publications is already a long one. Many of its reports are purely practical, intended for the information and guidance of the farmer; others are more strictly scientific and are designed to serve educational purposes.

Strange as it may seem, the United States, one of the youngest of the world's powers, is a pioneer in the kind of economic work outlined in the present paper. European countries, however, are now recognizing the immense importance to agriculture of such investigations and their absolute necessity as the basis for national and international laws.

As the world's population increases and as vast regions of land now wild and uncultivated are brought under the plow, so must investigations of the kind entrusted by Congress to the Biological Survey ever assume more and more importance.

A FEW THOUGHTS CONCERNING EUGENICS

By Alexander Graham Bell

The following paper is an address by Dr Bell to the American Breeders' Association at the recent convention of the Association in Washington, January, 1908. This Association was formed several years ago to encourage those persons of the United States working to improve our plants and animals. The President of the Association is Hon. James Wilson, Secretary of Agriculture, and the Secretary, Hon. Willett M. Hayes, Assistant Secretary of Agriculture. Every person who is interested in the scientific work of the Government and of individuals of the United States to create stronger and more productive varieties of animals or plants is eligible for membership. The Association is doing splendid work in collecting and distributing the results of the many workers along these lines. One branch of the Association includes efforts to improve the human race, and it was as a member of the Committee on this subject of eugenics that Dr Bell presented this address.

THE subject you have entrusted to your Committee on Eugenics is of transcendent importance to mankind. It is no less a question than the consideration of whether it is possible to apply the principles of selective breeding to man for the benefit of the human race. If it is true that "the proper study of man is man," no higher or nobler subject of research can be found.

I esteem it an honor to have been selected by you to serve on the committee having this matter in charge, and to be associated with the eminent men who compose the committee, under the leadership of Dr David Starr Jordan, President of Leland Stanford University. President Jordan, as chairman, has already presented a preliminary report for the committee, which has met with the ready acceptance of all the members.

As the Committee on Eugenics has not yet held a meeting for conference and discussion, it will of course be understood that anything I may say upon the subject today expresses merely my own individual views, for which the committee is in no way responsible.

The improvement of the human race depends largely upon two great factors, heredity and environment; and we deal chiefly with the question of heredity. It is a breeder's problem with which we are mainly concerned and not a question of education or environment.

We have learned to apply the laws of heredity so as to modify and improve our breeds of domestic animals. Can the knowledge and experience so gained be made available to man, so as to enable him to improve the species to which he himself belongs?

Can we formulate practical plans that might lead to the breeding of better men and better women? This is the great question we are called upon to consider.

The problem is one of great difficulty and perplexity, for its solution depends upon the possibility of controlling the production of offspring from human beings. By no process of compulsion can this be done. The controlling power, if it is possible to evoke it in the interests of the race, resides exclusively with the individuals most immediately concerned. This fact, I think, should be recognized as fundamental, so that our processes should be persuasive rather than mandatory.

The great hope lies in the fact that human beings possess intelligence, and a desire that their offspring may be fully up to the average of the race in every particular, if not superior. It is certainly the case that no man desires that his children shall be weak, sickly, defective, or in any way inferior in physical or mental endowments. A condition of sentiment therefore prevails that is eminently favorable to voluntary compliance

with plans that appeal to reason and sound judgment. The mere dissemination of information concerning those conditions that result in superior or inferior offspring would of itself tend to promote the production of the superior and to lessen the production of the inferior elements.

Knowledge is what is wanted, and the dissemination of that knowledge among the people. There is a wide field here for your Committee on Eugenics, or for some great national organization or society devoted to the increase and diffusion of knowledge concerning eugenics.

CONSANGUINEOUS MARRIAGES.

If it should be clearly shown that certain classes of marriages are hurtful to the offspring and others beneficial, the mere dissemination of that knowledge would of itself tend to promote desirable and prevent undesirable unions of the sexes. Would any reasonable person, for instance, think of marrying his first cousin, any more than he would dream of marrying his sister, if he really believed that any harm would result to the offspring; and if you could find one such person could you find two—for it takes two to make a marriage.

The fact that such marriages are contracted in spite of legislative prohibition in several of our states, and in spite of a considerable public feeling against such unions, simply shows that there is a difference of opinion upon the subject.

The only justification for legislative interference lies in the belief that consanguineous marriages are harmful to the offspring. The only justification for marriage under such circumstances lies in the belief that they are not harmful—at least, in particular cases. A question of fact is here involved, not mere opinion. Are they harmful or are they not Or if they are harmful in some cases and not in others, what are the conditions under which they are harmful? These are questions that might well be considered by your Committee on Eugenics.

The experience of breeders of animals would be especially helpful in this connection. It is extremely difficult to collect statistics upon a large scale regarding consanguineous unions among human beings, but a breeders' association could surely supply statistics concerning animals. We all know that the laws of heredity that apply to animals also apply to man; and statistics of in-breeding would be of great value if they could be so arranged as to throw light upon the effect of consanguineous unions in human beings. I understand that while breeders recognize an element of danger in consanguineous unions, and especially in continuous in-breeding for a number of successive generations, they constantly resort to in-breeding to perpetuate and intensify *desirable* characteristics. In fact, it is usually through in-breeding that thoroughbreds are produced; and it is chiefly through the prepotency of thoroughbreds that races of domestic animals are improved. If there are any conditions under which consanguineous unions would be of benefit to man they should be made known, so as to enable us to understand, certainly, what conditions are beneficial and what harmful, to the end that public opinion may be rightly guided in its treatment of this important subject.

We have statistics which indicate very clearly that consanguineous unions should not be contracted by defective persons, and the results obtained by Dr E. A. Fay* are specially significant in this connection. He shows that there is considerable liability to the production of deaf offspring where a deaf-mute marries a blood relative, even in cases where the original deafness was not congenital.

The statistics of the twelfth census† of the United States show that at least 4.5 per cent of the deaf of the country, and 4.5 per cent of the blind are the offspring of consanguineous marriages, but we do not know conclusively whether consanguinity in the parents *produces* the defective con-

* Marriages of the Deaf in America, by Edward Allen Fay. Published by the Volta Bureau, Washington, D. C., 1898.

† Special Report on the Blind and the Deaf in 1900. U. S. Census publication, Washington, D. C., 1906.

dition, or whether it simply *intensifies* a preëxisting tendency in the family.* The largest percentages of children of cousin marriages are found among the deaf who have deaf relatives (8.8 per cent), and among the blind who have blind relatives (9.5 per cent); whereas in sporadic cases the percentage falls to little more than 3 per cent—that is, about 3 per cent of the deaf who have no deaf relatives (3.3 per cent) and about 3 per cent of the blind who have no blind relatives (3.2 per cent) are the offspring of cousin marriages. This may mean a great deal or it may mean nothing at all. Should we find, for example, that 3 per cent of the population of the United States are the offspring of consanguineous unions there would be no proof that the consanguinity of the parents had anything to do with the production of the defect in these cases. Statistics showing the proportion of the whole population who are the offspring of consanguineous marriages are much needed, and the whole subject, I think, might very properly be investigated through the medium of the United States Census Bureau.

THE IMPORTANCE OF THE INFERIOR IS OVERRATED

In any large aggregate of individuals the vast majority will be of the average type of the race. Some few will be markedly superior and some few inferior.

An increase in the superior element seems to be a more important factor in producing improvement than a decrease in the inferior element. Even were we to go to the extreme length of cutting off entirely the reproduction of the inferior, this would not lead to an increase in the numbers of the superior, but on the contrary to a decrease; for some of the superior are the offspring of inferior parents, just as some of the inferior are the offspring of superior.

In the case of superior, average, and inferior persons all three classes would be reproduced in the offspring, but in different proportions. There would be a larger proportion of superior children among the offspring of the superior than of the average or inferior, and a larger proportion of inferior among the offspring of the inferior. The cutting off of the inferior would simply prevent deterioration by lessening the production of inferior offspring. It would not operate to cause an improvement by an increase of the superior element.

I am much struck by the thought that neither the quantity nor quality of the

* *The Deaf of the United States in 1900 from Census Table XLVII, omitting "not stated" cases relating to consanguinity of parents and Deaf Relatives.*

The deaf.	Numbers.			Percentage.	
	Total.	Parents cousins.	Parents not cousins.	Parents cousins.	Parents not cousins.
Total	77,550	3,911	73,639	5.0	95.0
Deaf relatives (*a* or *b*):					
Deaf relatives	24,723	2,171	22,552	8.8	91.2
No deaf relatives	52,827	1,740	51,087	3.3	96.7

The Blind of the United States in 1900 from Census Table XVIII, omitting "not stated" cases relating to consanguinity of parents and Blind Relatives.

The blind.	Numbers.			Percentage.	
	Total.	Parents cousins.	Parents not cousins.	Parents cousins.	Parents not cousins.
Total	55,307	2,449	52,858	4.4	95.6
Blind relatives (*a*, *b*, or *c*):					
Blind relatives	10,483	993	9,490	9.5	90.5
No blind relatives	44,824	1,456	43,368	3.2	96.8

superior element would be increased by cutting off the inferior element from reproduction, and I begin to suspect that students of eugenics have overrated the importance of legislative interference with the marriages of the inferior.

CELIBATE FELLOWSHIPS

A similar process of reasoning leads to the conclusion that the cutting off of the superior element from reproduction would retard the improvement of the race by lessening the production of superior offspring without injuring the community by increasing the production of the inferior elements.

The establishment of celibate fellowships in some of the oldest of the British universities is a case in point. The annual grants are sufficiently large to support the recipients in comfort, so as to enable them to devote their whole lives to some branch of literature, science, or art undisturbed by the necessity of earning a livelihood. Of course there is great competition to secure such prizes, and the finest and brightest young men are selected by competitive examinations to receive the fellowships. Thus young men of the most brilliant intellectual attainments are enabled to secure a support for life—*but only on the condition of celibacy*. The moment they marry they lose their fellowships. If there are many of these fellowships, and if the plan has been in operation for any considerable period of time, it might be well for students of eugenics to inquire whether the establishment of celibate fellowships in the past has had anything to do with the scarcity of young men of the highest intellectual caliber that is so much deplored in England today. Whether it has or has not, it would certainly seem more advisable in the interests of the community that such fellowships should be granted upon the condition of marriage rather than celibacy.

PREPOTENCY—THE KEY TO THE PROBLEM

Superior individuals on the whole have a larger proportion of superior offspring than the average of the race. Of course in cases where both parents were superior this prepotency is increased. It would be still further increased if all the four grandparents were superior, and if three or four generations of ancestors were all individually superior a thoroughbred would be produced. We are all familiar with the prepotency of the thoroughbred among animals. Indeed, as I have said before, it is mainly through the use of thoroughbreds that we improve our stocks of domestic animals. In the case of men and women who are thoroughbred in respect to the points of superiority, it is obvious that their descendants, spreading out among the population and marrying into average or inferior families, would prove prepotent over their partners in marriage in affecting the offspring, thus leading to an increase in the proportion of superior offspring produced from the average or inferior with whom they have mated. Thus not only would the proportion of superior offspring produced by the community as a whole be increased, but the level of superiority in the superior class would also be raised. There would thus be a general advance in the possession of desirable qualities all along the line from the lowest to the highest. Is not this what we mean by improvement of the species?

LEGISLATIVE RESTRICTIONS UPON MARRIAGE UNWISE

This result, I am inclined to believe, would follow from the simple process of promoting the marriage of the superior with the superior without resort to legislative restrictions upon marriage to reduce the production of the inferior.

Of course, such restrictions should be considered, but the moment we propose to interfere with the liberty of marriage we tread upon dangerous ground. The institution of marriage not only provides for the production of offspring, but for the production of morality in the community at large. This is a powerful reason why we should not interfere with it any more than can possibly be helped. There are other reasons, however, arising from a consideration of the rights possessed by individuals in a free community.

Among the inalienable rights recog-

nized by the Declaration of Independence are "life, liberty, and the pursuit of happiness." The community has no right to interfere with the liberty of the individual and his pursuit of happiness in marriage unless the interests of the community are demonstrably endangered. The happiness of individuals is often promoted by marriage even in cases where the offspring may not be desirable. The production of undesirable children is, of course, an injury to the community, and there may perhaps be cases where legal checks may be justified; but it should not be lost sight of that there are other checks that are equally if not more efficient that can be brought into play. If the conditions that produce undesirable offspring could be authoritatively stated, prudential restraints are apt to arise in cases where defective offspring are likely to be produced. Where the general intelligence of the individuals concerned is at fault, or their duty to the community is not fully understood or realized, another check comes into play far more efficient than any legal restriction. Public opinion is a great compelling force and few there are who can resist it.

Legal prohibition of marriage should only be resorted to in cases where there could be no manner of doubt that the community would suffer as the result of the marriage. Where doubt exists the community has no right to interfere with this most sacred and personal of all relations; and morality in the community would certainly be more promoted by affording the widest possible liberty of marriage than by restricting it. After all, the interests of the community are affected not so much by the fact of a marriage as by the production of undesirable offspring. The only reason why legislation against marriage should be considered at all lies in the fact that we cannot well legislate against the production of offspring. Unfortunately prohibition of marriage does not necessarily prevent the production of offspring. It is surely advisable that the children born in a community should have legal fathers and mothers as much as possible. Public opinion, and the desire of all persons to have healthy offspring, would, in my judgment, be a more powerful deterrent to the production of undesirable offspring than a compulsory process of law. Throw wide the gates of marriage, and where children are produced close tight the doors of divorce. Every child is entitled by nature to a father and mother; and no people should produce children who are not prepared to give them parental care for life. Without going to extremes, I would say that the interests of the community demand that we should make marriage easy and divorce difficult.

NEW BLOOD

The problem of improving a race of human beings is a most perplexing one to handle. The process of improvement must be slow where the forces concerned act from within and are not amenable to control from without. Under the best conditions it would require several generations to produce sensible results; but in the United States we have, in the new blood introduced from abroad, an important means of improvement that will act more quickly and that is eminently susceptible to control. All the nations of the world are today contributing elements to our population; and we have now, and now only, the opportunity of studying the process of absorption before it is complete. Why should not Congress provide for an ethnical survey of the people of the United States. We should have definite and reliable information concerning those foreign elements which are beneficial to our people and those which are harmful.

The grand spectacle is presented to our eyes of a new people being gradually evolved in the United States by the mingling together of the different races of the world in varying proportions. It is of the greatest consequence to us that the final result should be the evolution of a higher and nobler type of man in America, and not deterioration of the nation.

To this end the process of evolution should be carefully studied, and then controlled by suitable immigration laws tending to eliminate undesirable ethnical elements, and to stimulate the admission of elements assimilated readily by our population and that tend to raise the standard of manhood here.

THE CARNEGIE INSTITUTION

THE Yearbook of the Carnegie Institution for 1907 just issued contains a summary by President Woodward of the five years' work of the institution, and an outline of its future plans. Many important investigations, too expensive or extraordinary for other institutions, and requiring years of consecutive work, have been begun. The benefits thus guaranteed to mankind cannot be measured.

The institution expended $702,534.39 in 1907 out of its endowment income for its projects of research and for publication and administration. The aggregate receipts thus far from interest on endowment, etc., have been $2,891,370.66, and of this sum in six years there has been disbursed $2,683,073.16.

President Woodward gives the following list of the larger projects, or departments of work, and of the directors conducting the researches in the departments, or laboratories:

Botanical Research: D. T. MacDougal
Economics and Sociology: Carroll D. Wright
Experimental Evolution: Chas. B. Davenport
Geophysical Laboratory: Arthur L. Day
Historical Research: J. F. Jameson
Marine Biology: Alfred G. Mayer
Meridian Astrometry: Lewis Boss
Nutrition Laboratory: Francis G. Benedict
Solar Observatory: George E. Hale
Terrestrial Magnetism: L. A. Bauer.

To this list may be added the work in horticulture carried on in the main by Mr Luther Burbank, but in a supplementary way also under the auspices of a committee consisting of the President and the heads of the three departments of biological research.

The minor projects and labors of research have been along the lines of:

Anthropology	History
Archeology	Literature
Astronomy	Mathematics
Bibliography	Meteorology
Botany	Paleontology
Chemistry	Philology
Economics	Phonetics
Engineering	Physics
Exploration	Physiology
Geology	Psychology
Geophysics	Zoölogy

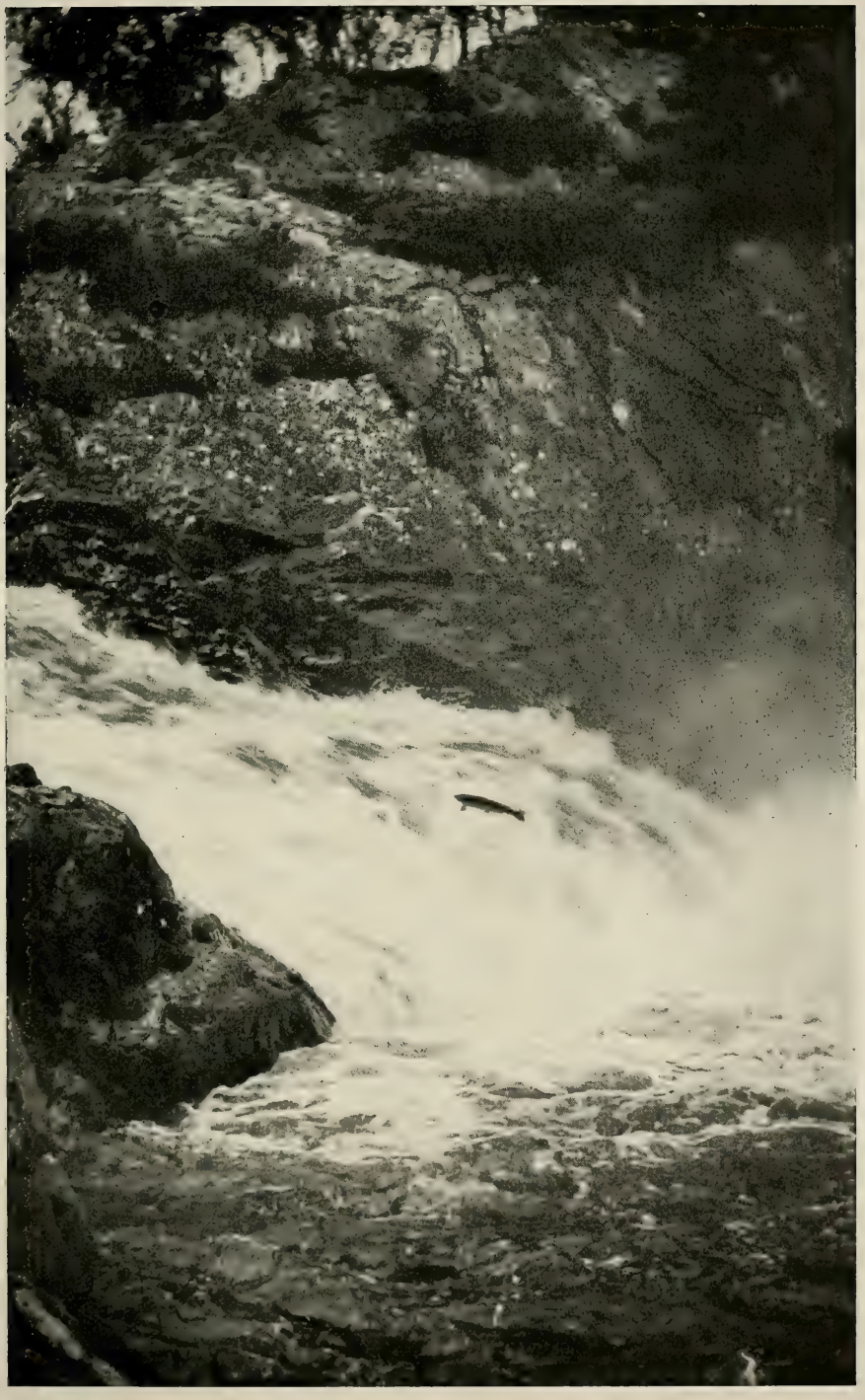
Among the notable publications of the year is No. 81, in which Director MacDougal gives an account of the production of a new species of plant by an application of chemical fluids to the parent plant seeds during the period of germination. This remarkable achievement must be regarded as one of the noteworthy advances in modern biology.

In its magnetic survey of the Pacific Ocean up to September 1, 1907, the *Galilee* has traversed nearly 50,000 miles in the Pacific Ocean along courses where few magnetic observations have been made hitherto. Complete measurements of magnetic declination, dip, and intensity were secured at intervals of 200 to 250 miles along these courses, as well as at numerous points on islands and at prominent ports. All of the results of this extensive survey available in March of the past year were furnished to the U. S. Navy Department and incorporated in a magnetic chart issued in May last by that department for the benefit of mariners. Important errors in previous charts, amounting in cases to as much as 5° in magnetic declination along some main routes of transportation, were thus corrected.

The Department of Economics is making a study of our immigrant population.

A JUMPING SALMON

THE picture on the following page is an enlargement of a "snapshot" taken by Dr Richard D. Harlan, of The George Washington University, in September, 1907, of a salmon trying to leap up the falls of the River Shinn, on Mr Andrew Carnegie's estate at Skibo, Scotland. The fish were about 2½ feet long. On that particular day some of them made the effort at frequent intervals, of a minute or two, to get up the falls, which were about 12 feet high. None of them were successful on that occasion because of the great volume of water. The fish in this picture struck fully 6 feet above the level of the lower stream, only to be hurled back. The picture has been enlarged without any retouching.



SALMON CAUGHT IN THE ACT OF TRYING TO LEAP UP THE FALLS OF THE SHINN

FUN FOR THE BOYS AND GIRLS IN THEIR FAVORITE SCHOOLGROUND, OSTRE ANLAEG, COPENHAGEN, DENMARK

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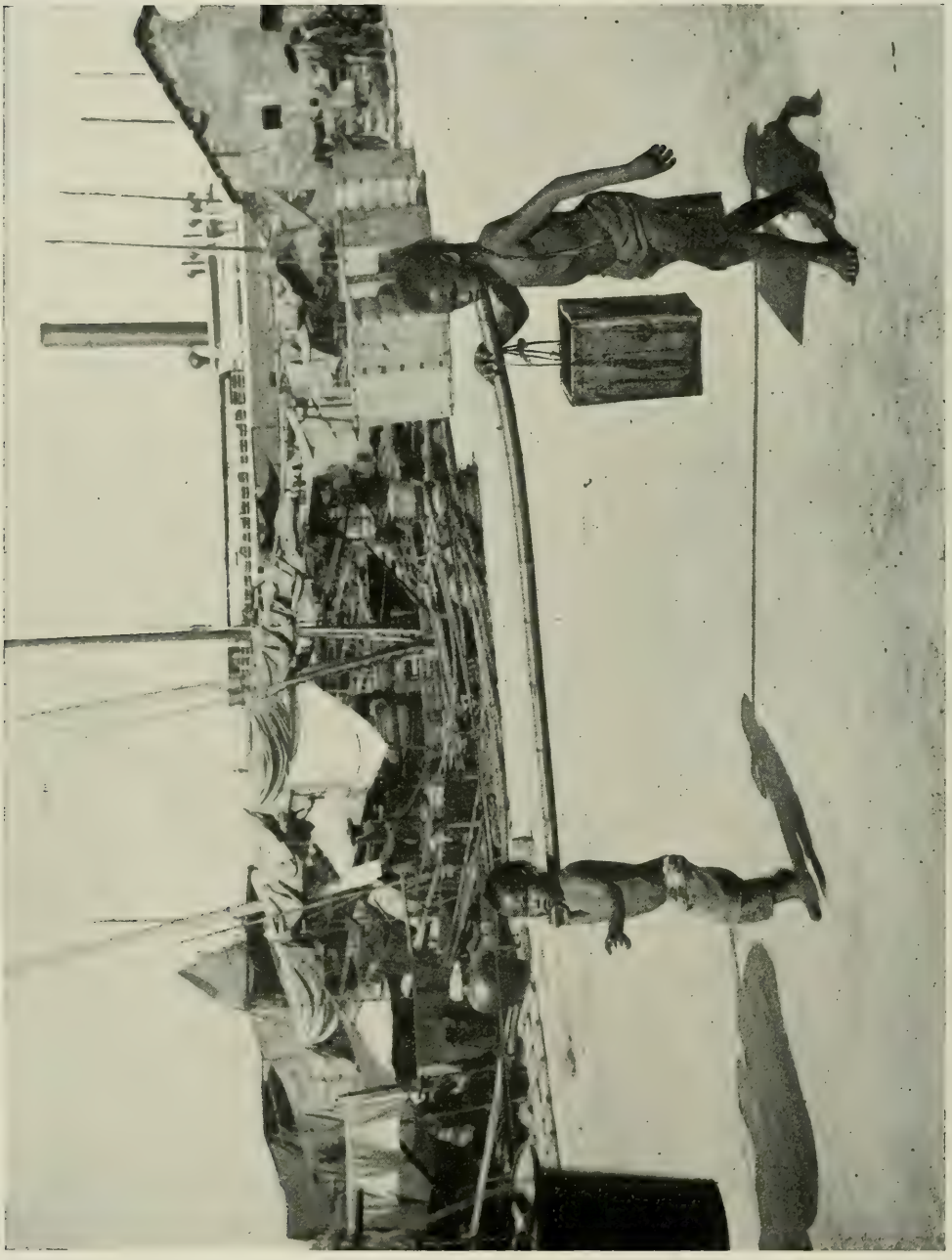
BOYS AND GIRLS OF AVE MARIA CHARITY SCHOOL, GRANADA, SPAIN



INFANT COOLIES IN CHINA

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PUPILS OF A MISSIONARY SCHOOL IN CHINA

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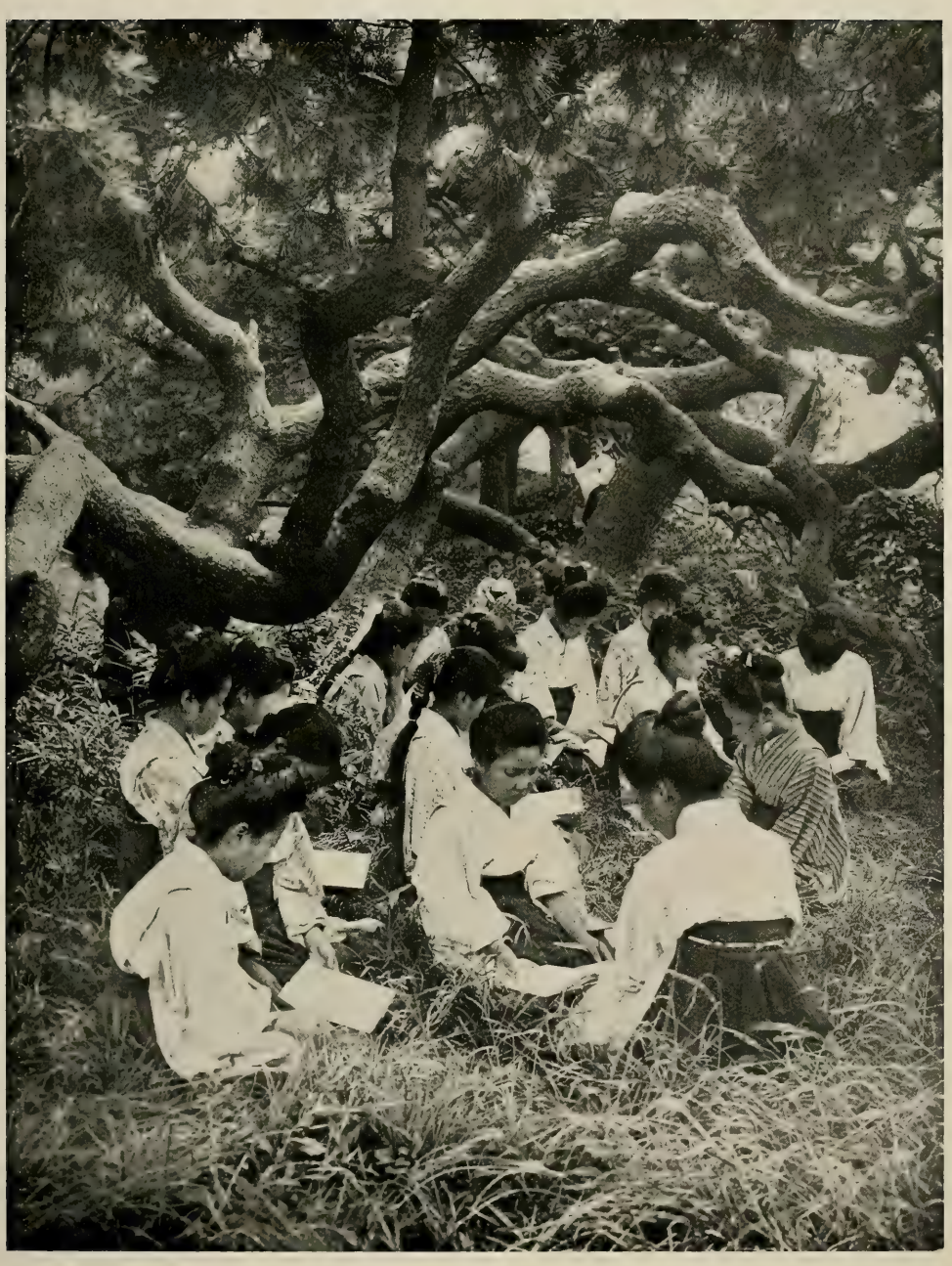
LITTLE JAPANESE SCHOOL-BOYS ENGAGED IN A LIVELY TUG OF WAR



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GIRLS UNDER THE TREES, TOKIO, JAPAN

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A GROUP OF BURMESE CHILDREN

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INDIA OF TOMORROW

Handsome school boys of Amritsar at the Golden Temple beside the Holy Tank

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A GROUP OF SCHOOL-GIRLS IN KAPIOLANI PARK, HONOLULU, HAWAII

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SCHOOL IN CEYLON, SHOWING PUPILS, TEACHER, AND SCHOOL-HOUSE

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JAVANESE AT GAROET—JAVANESE WOMEN AND CHILDREN

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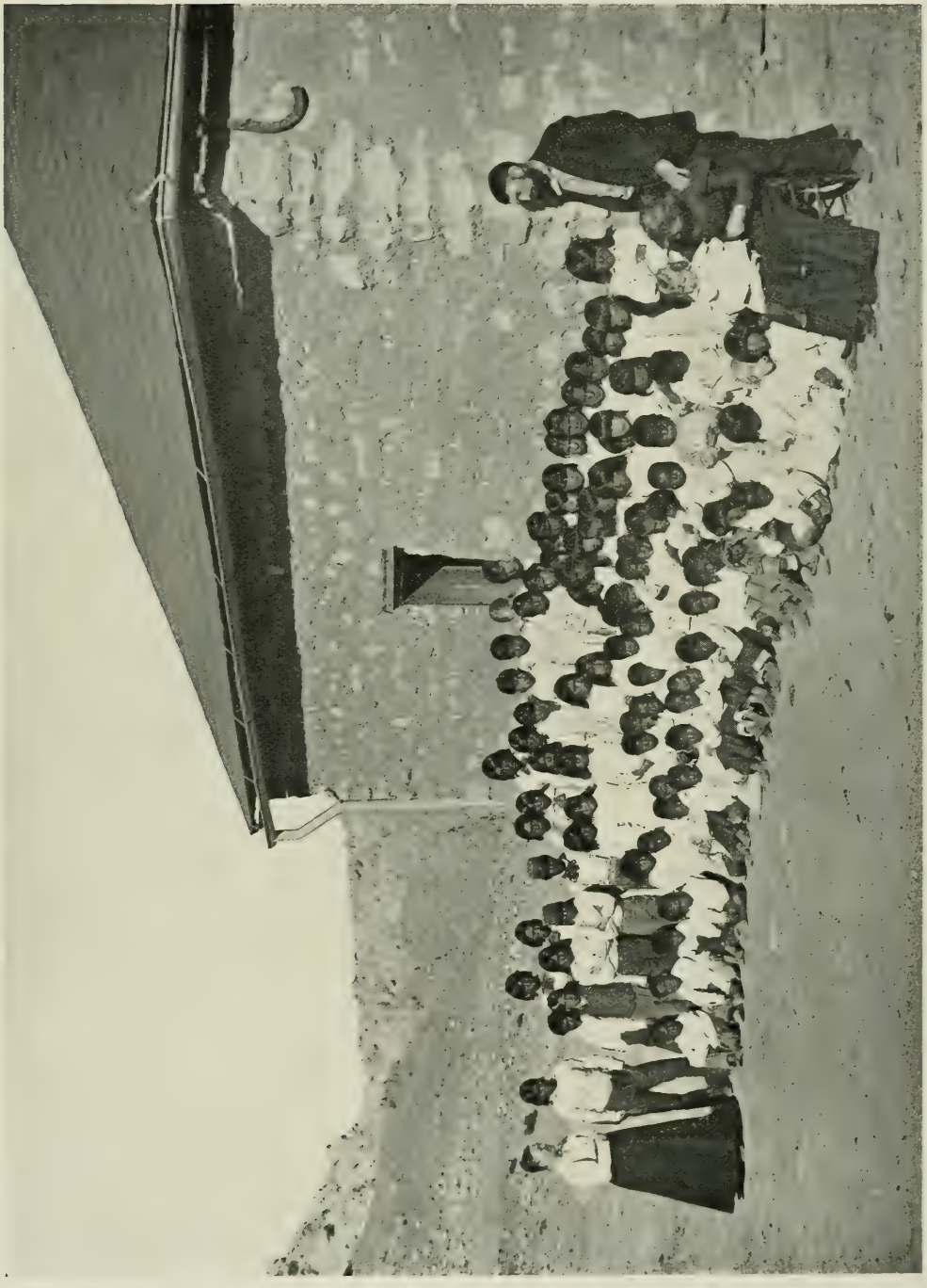
WEST INDIAN PICKANINNIES, SCHOLARS, AND TEACHER BEFORE A SCHOOL-HOUSE IN JAMAICA



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UNITED STATES SCHOOL ON INDIAN RESERVATION AT THE SECOND MESA OF THE MOKI COUNTRY

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MEETING AT MISSION SCHOOL AT NIBUNZA BOBUNA VILLAGE, CONGO

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BOYS STUDYING ON THE HOUSETOP AT ASSIOUT, EGYPT

TEN YEARS IN THE PHILIPPINES

The following article has been abstracted from the report of the Secretary of War, Hon. William H. Taft, on his recent trip to the Philippines and the opening of the Philippine National Assembly. The report contains a review of what the United States have done in the Philippine Islands since our acquisition of them nearly ten years ago. The Americans are driving Asiatic cholera, bubonic plague, and smallpox, which formerly caused thousands and thousands of deaths annually, out of the Philippine Islands as thoroughly as they have freed Panama from yellow fever. President Roosevelt, in transmitting the report to Congress, could rightly say:

"No great civilized power has ever managed with such wisdom and disinterestedness the affairs of a people committed by the accident of war to its hands. . . . Save only our attitude toward Cuba, I question whether there is a brighter page in the annals of international dealing between the strong and the weak than the page which tells of our doings in the Philippines."

PEACE prevails throughout the Philippines today in a greater degree than ever in the history of the islands, either under Spanish or American rule, and agriculture is nowhere now impeded by the fear on the part of the farmer of the incursion of predatory bands. A community consisting of 7,000,000 people, inhabiting 300 different islands, many of whom were in open rebellion against the government of the United States for four years, with all the disturbances following from robber and predatory bands which broke out from time to time, due to local causes, has been brought to a state of profound peace and tranquillity in which the people as a whole are loyally supporting the government in the maintenance of order. This is the first and possibly the most important accomplishment of the United States in the Philippines.

Our national policy is to govern the Philippine Islands for the benefit and welfare and uplifting of the people of the islands and gradually to extend to them, as they shall show themselves fit to exercise it, a greater and greater measure of popular self-government. One of the corollaries to this proposition is that the United States in its government of the islands will use every effort to increase the capacity of the Filipinos to exercise political power, both by general education of the densely ignorant masses and by actual practice, in partial self-government, of those whose political capacity is such that practice can benefit it without too great injury to the efficiency of government. What should be emphasized in the statement of our national policy is that we wish to prepare the Filipinos for *popular* self-government.

THE NATIONAL ASSEMBLY IS DEVISED TO TRAIN THE EDUCATED CLASSES IN SELF-GOVERNMENT WHILE THE IGNORANT MASSES ARE BEING EDUCATED

The organization of the National Assembly is one of the great steps in the education of the Filipino people for complete self-government.

I do not for a moment guarantee that there will not at times be radical action by the Assembly, which cannot meet the approval of those who understand the legislative needs of the islands, but all I wish to say is that the organization and beginning of the life of the Assembly have disappointed its would-be critics and have given great encouragement to those who were responsible for its extension of political power.

The Assembly has shown a most earnest desire, and its leaders have expressed with the utmost emphasis their intention, to labor for the material prosperity of the Philippines and to encourage the coming of capital and the development of the various plans for the improvement of the agriculture and business of the islands which have commended themselves to those in the past responsible for the government there. In other words, thus far the Assembly has not manifested in any way that obstructive character which those who have prophesied its failure expected to see.

In arguing that the Philippines are entirely fit for self-government now, a com-

mittee of educated Filipinos once filed with the civil governor a written brief in which it was set forth that the number of "ilustrados" in the islands was double that of the offices—central, provincial, and municipal—and therefore the country afforded two "shifts" of persons competent to run the government. This, it was said, made clear the possibility of a good government if independence was granted. The ignorance of the remainder of the people, admitted to be dense, made no difference. I cite this to show of how little importance an intelligent public opinion or an educated constituency is regarded in the community and government which many of the educated Filipinos look forward to as a result of independence.

THE FILIPINO IS THE ONLY MALAY RACE THAT IS CHRISTIAN

No one denies that 80 per cent of the Filipino people are densely ignorant. They are in a state of Christian tutelage. They are childlike and simple, with no language but a local Malay dialect spoken in a few provinces; they are separate from the world's progress. The whole tendency under the Spaniards was to keep them ignorant and innocent. The Spanish public-school system was chiefly on paper. They were for a long time subject completely to the control of the Spanish friar, who was parish priest and who generally did not encourage the learning of Spanish or great acquaintance with the world at large.

The world owes to the Spanish friar the Christianization of the Filipino race. It is the only Malay or oriental race that is Christian. The friars beat back the wave of Mohammedanism and spread their religion through all the islands. They taught the people the arts of agriculture, but they believed it best to keep them in a state of innocent ignorance. They feared the influence of world knowledge. They controlled the people and preached to them in their own dialects. They lived and died among them.

The friars left the people a Christian people—that is, a people with western ideals. They looked toward Rome, and Europe, and America. They were not like the Mohammedan or the Buddhist, who despise western civilization as inferior. They were in a state of tutelage, ripe to receive modern western conceptions as they should be educated to understand them. This is the reason why I believe that the whole Christian Filipino people are capable by training and experience of becoming a self-governing people. But for the present they are ignorant and in the condition of children.

THE PROBLEM CAN BE SOLVED BY THE EDUCATION OF ONE GENERATION

There is no real difference between the educated and ignorant Filipinos that cannot be overcome by the education of one generation. They are a capable people in the sense that they can be given a normal intellectual development by the same kind of education that is given in our own common-school system. Now they have not intelligence enough to exercise the political franchise with safety to themselves or their country; but I do not see why a common-school education in English, with industrial teaching added, may not make the children of these people capable of forming an intelligent public opinion needed to sustain a popular government if, at the same time that the oncoming generations are being educated in schools, primary and industrial, those who are intelligent are being given a political education by actually exercising the power of the franchise and actually taking part in the government.

The Philippine government, however, has not funds enough to educate in primary and industrial schools all the present generation of school age, and unless some other source of funds than governmental revenues is found it will take longer than a generation to complete the primary and industrial education of the common people. Until that is done, we ought not to lift our guiding hand from the helm of the ship of state of the Philippine Islands.

The language selected for the schools is English. It is selected because it is the

language of business in the Orient, because it is the language of free institutions, and because it is the language which the Filipino children who do not know Spanish are able more easily to learn than they are to learn Spanish, and it is the language of the present sovereign of the islands. The education in English began with the soldiers of the American Army, one of whom was detailed from each company to teach schools in the villages which had become peaceful. When the Commission assumed authority it sent to the United States for 1,000 American teachers, and after the arrival of these pioneers in the islands a system of primary schools was inaugurated together with normal schools.

There are engaged in the teaching of these schools at present 717 permanent American teachers and 109 temporary appointees, and all of these are paid out of the central treasury.

6,000 FILIPINOS TEACHING ENGLISH

The 6,000 Filipino teachers who are now teaching English have received their English education from our normal schools or our American teachers. Their number is growing, and they represent and are the most valuable educational asset we have acquired in working out our school system. The Filipino insular teachers are drawn from graduates of normal schools and also from the students sent by the government and at the expense of the government to the United States to be educated there. Forty-six of these students have recently returned from the United States and have been appointed as insular teachers at salaries ranging from 840 to 960 pesos per annum. We are not able to educate as they should be educated more than a half of the youth of school age in the islands. The government, while contributing to the maintenance of high schools in each province, is devoting its chief attention to the spread of primary education, and in connection with primary education, and, at its close in the intermediate schools, to industrial education. Primary and industrial education carried on until the child is 14 or 15 years old is thought to be the best means of developing the Filipino people into a self-sustaining and self-governing people, and the present government has done all that it has been possible to do in developing and maintaining a proper system for this purpose.

ALREADY MORE FILIPINOS SPEAK ENGLISH THAN SPEAK SPANISH

The influence of the primary instruction in English is shown throughout the islands by the fact that today more people throughout the islands, outside of Manila and the large cities, speak English than speak Spanish. At times, as already intimated, a discordant note is heard in the suggestion that the American government is seeking to deprive the Filipino of his native language. As his native language is really 15 or 16 different dialects, this does not seem a great deprivation.

Should Congress be anxious to facilitate and hurry on the work of redeeming the Philippine Islands and making the Filipino people a self-governing community, it could take no more effective step than a permanent appropriation of two or three millions of dollars for ten or fifteen years to the primary and industrial education of the Filipino people, making it conditional on the continued appropriation by the Philippine government of the same amount to educational purposes which it has devoted and is now devoting annually to that purpose. The influence of the educational system introduced has not only been direct in the spread of education among the younger of the present generation, but it has also been an indirect means of convincing the Filipino people at large of the beneficent purpose of the American government in its remaining in the Philippine Islands and of the sincerity of its efforts in the interest of their people.

FILIPINO CADETS AT WEST POINT

Section 36 of the act of Congress approved February 2, 1901, referring to Philippine Scouts, provides that—

"When, in the opinion of the President,

natives of the Philippine Islands shall, by their services and character, show fitness for command, the President is authorized to make provisional appointments to the grades of second and first lieutenants from such natives, who, when so appointed, shall have the pay and allowances to be fixed by the Secretary of War, not exceeding those of corresponding grades of the regular army."

As it is thought that better results will be obtained if a few young Filipinos, especially selected, be appointed to the United States Military Academy with a view to their being commissioned officers of scouts upon graduation, I strongly recommend that Congress, by appropriate legislation, authorize the appointment of seven young Filipinos, or one for about every million of inhabitants of those islands, as cadets at the Military Academy at West Point. This action on the part of Congress would, in my judgment, tend to further increase the zeal and efficiency of a body of troops which has always rendered faithful and satisfactory services.

THE DEATH RATE OF AMERICANS IN THE PHILIPPINES NO GREATER THAN IN OUR SOUTHERN CITIES

There is always present in every picture of Philippine progress as painted by those who have not carefully investigated the facts a somber background of a baneful climate, making it impossible for the American or European to live in health and strength in the islands for any length of time. It is true that the islands are in the tropics, and that the variations in temperature are only about a third as much in extent as in the temperate zone; but, for a tropical climate, that of the Philippines is exceptionally comfortable and healthful. The monsoons blow six months from southwest across the islands and six months from the northeast, so that they are constantly windswept. This makes a radical difference between the climate of the islands and that of the lowlands of India, for instance. The last two decades, especially the latter, have taught us much in respect to tropical diseases, their causes, their proper treatment, and the best method of avoiding them. This was one of the most valuable results of the Spanish war.

In his address as president of the Philippine Medical Association, in March, 1905, Dr John R. McDill, who came first to the islands as a leading army surgeon and who left the army to carry on a most successful practice in Manila, said:

"We have come to esteem to the utmost the climate which so effectually guards many of you against the too strenuous life and which is almost ideal eight months in the year, even in Manila. Our professional experience has proven that, excepting some intestinal disorders which we are rapidly preventing and curing and a limited amount of epidemic infectious diseases, there is nothing unusual about the kind or amount of disease encountered here, or its successful treatment when hospital care is available. The surgeon's work has fully demonstrated that ideal wound healing and convalescence after operation is as much the rule here as anywhere in the world. We physicians also know that and appreciate that the dread diseases of childhood so prevalent at home are rare here, and that of all the ills, particularly among women, from real bodily ailments to a poor complexion, for which the climate is usually blamed, the great majority are hereditary or acquired, were brought here by the patient, and often aggravated by careless and unhygienic living. For old people and children the climate is an earthly Elysium. . . . With the improved and constantly improving conditions of living, we believe that almost all will agree that by observing the normal and moral life healthy Americans can live about as long here and enjoy as good health and do as much good and hard work, more than three-fourths of the year, as we could in the home land."

The death rate among American soldiers in the Philippines for the last year was 8.5 per thousand, and the previous year 8.65. General Wood reports that the size of the sick report cannot be properly charged to the climate; that, taken

as a whole, the reports for the years indicate a decided improvement in health conditions, and that the men leaving the islands after a regular tour of more than two years present a far better appearance than those of the incoming.

The death rate among American civilians in Manila for the fiscal year ending June 30, 1907, was 5.59 per thousand, a reduction from the previous year. The death rate among Filipinos this year in Manila was 36.9 per thousand and among Spaniards 15.84, both reductions from the previous year.

During the decade of our stay in the islands the conditions of life for Americans have steadily bettered. We have become acquainted with hygienic methods of living, and the death rate of Americans of the same social condition in the Philippines is certainly not greater than in the cities of the Southern States, and is, as we have seen, very much less than that among Filipinos.

WE HOPE TO MAKE THE FILIPINOS LARGER AND STRONGER PHYSICALLY

If the United States is to continue its governmental relations with the Philippines for more than a generation and its business and social relations indefinitely, the fact that Americans can live healthful lives in the Philippines is important of itself; but I have cited these statistics and this expert opinion to show more than this—I believe that it has an important bearing upon another kind of progress possible among the Filipino people, and that it opens another important field of education for the American government to cultivate in the islands.

No one can be in the Philippines long without realizing that as a race the Filipinos are small of stature, slight of frame and flesh, and with small powers of resistance to epidemic diseases. It has been supposed that because of their nativity the Filipinos were not subject to the malarial, intestinal, and dysenteric troubles that afflict Americans and Europeans, and that measures taken to avoid or cure such troubles in the case of the foreigner were unnecessary and superfluous with the Filipinos. Recent investigations of a systematic kind, carried on by keeping comparative statistics of all the official autopsies made in the islands, seem to show that the assumption that the Filipinos are immune from the forms of disease I have mentioned is without foundation. The autopsies of 100 cases showed in a great majority the germs of malaria, of amœbic dysentery, and that microbe of the so-called "lazy" disease of Porto Rico known as the "hookworm." It is true that the diseases were not active or acute, but their presence in the system of course weakened the constitution of the subject and could easily explain his anæmic condition, his smallness of stature, and small powers of resistance. Malaria, of course, is produced or at least transmitted by the mosquito, while amœbic dysentery and the "lazy" disease are water-borne and proceed directly from the miserable sources of water supply in most Filipino towns. Proper precautions can avoid all these, or at least can greatly reduce the number of victims.

In Manila, 60 per cent of all infants born die during the first year of their lives, and there is no reason to believe that infant mortality in other parts of the islands is less. This frightful percentage is brought about by ignorance and neglect of the mothers in feeding their babies. There are very few, if any, milch cows in the islands, and the little ones are fed with all sorts of impossible things. They die generally of a lack of nourishment. There is no reason why, if the mothers were correctly taught and proper infant food were brought within the reach of the poor, this awful rate of infant mortality might not be reduced. Not only is there an actual loss of life which might be avoided, but the babies which live through such treatment and nourishment are not apt to make strong men and women, but are likely to become victims of anæmia and other diseases mentioned, as shown in the autopsies I have referred to.

I do not think it is unjust to the Spanish régime in the Philippines to say that very little, if any, attention was paid to

sanitation according to modern methods. In the city of Manila and in the other large towns of the islands the American military medical authorities, who were the first to assume responsibility for the health of the islands, found the same utter disregard of the proper rules for the disposition of house sewage that was found in Habana. Thousands, yes, tens of thousands, of Filipinos were carried off year after year by a peculiarly virulent type of smallpox.

In Manila, in Cebu, and in Nueva Caceres, respectively, were leper hospitals, but in each the management was inefficient and the care of the inmates poor. More than this, no supervision was exercised to isolate lepers not in hospitals. Sometimes the poor creatures were driven out of villages by popular riots and herded together with no proper food and no shelter. The contact of lepers with the people of course only increased the number of cases of the dread disease.

In 1885 or 1886 the islands were visited by an epidemic of cholera, and the prostration of the people of Manila and the Philippines, due to the rapid spread of the scourge, beggared description. In Manila the deaths were 1,000 or more a day from that cause alone for a number of weeks. The trade proximity of Manila, Iloilo, and Cebu to China, India, Java, Burma, and the Straits Settlements makes the danger of transmitting tropical and other infectious diseases very much greater.

Quarantine in Spanish times was lax. The American Army medical authorities took hold of the matter of sanitation in their usual vigorous way and made much progress in the matter of quarantine and in correcting the glaringly unsanitary conditions in Manila. But it remained for the civil government to effect a thorough organization of a health department which could do permanent good.

The introduction of sanitary methods by law among the people has given rise to more dissatisfaction and greater criticism of the government than any other one cause. The truth is that the people have to be educated in the effectiveness of such methods before they can become reconciled to them, and the work of the health department since the beginning of the civil government, in 1901, has been obstructed, first, by the inertia and indifference of the people in respect to the matter, and, second, by their active resistance to affirmative restraints upon them necessary to prevent disease.

SMALLPOX AND ASIATIC CHOLERA STAMPED OUT

The fight against smallpox has been so successful that in the past year not a single death from it occurred in Manila, and in the provinces of Cavite, Batangas, Cebu, Rizal, Bataan, La Laguna, and La Union, where heretofore there have been approximately 6,000 deaths per year, not one was reported. In the few places in other provinces where smallpox appeared it made little headway. More than 2,000,000 vaccinations against smallpox were performed last year, and vaccination is being carried on so that it will reach every inhabitant of the islands.

In 1902 Asiatic cholera appeared. The loss the first year by reason of the methods introduced was much less than it had been fifteen or sixteen years before, but great difficulty was encountered in putting into force the health regulations, and a futile attempt was made to establish quarantine between localities in the islands. Since that time a better system of isolation and stamping out the disease in the locality where it appeared has been followed, and it is gratifying to note that, although the dread disease appeared each year, it was finally brought to an end on November 27, 1906, and the authorities now feel that the people have been so thoroughly roused to the best methods of treating the disease that any local reappearance of it can be readily suppressed.

In 1902 or 1903 the bubonic plague appeared in the islands. This has been suppressed by the isolation of all persons suffering from the disease and the de-

struction of plague-infected rats, so that during the last year there were no cases of bubonic plague whatever.

LEPROSY ALSO BEING ERADICATED

When the Americans first began government in the Philippines it was reported that leprosy was so widely extended in the islands that there were probably from 25,000 to 50,000 lepers to be cared for. After many unsuccessful efforts a leper colony has finally been established at Culion, a healthful and attractive island between Panay and Palawan, to which all the lepers of the islands are now being gradually removed. The number probably does not exceed 3,000. The course pursued is to take each province separately and by thorough investigation of the reported cases of lepers determine those of true leprosy and to remove them thence to the colony of Culion. The experiment at first was a doubtful one because of the objection of the lepers to being taken so far away from their homes, and some of the friends of lepers made vigorous objections to this course. After the removal of the first 500, however, and when they found how comfortable and agreeable life at Culion was, the objections ceased. Leprosy as a disease usually does not directly kill its victims, but it so weakens the powers of their resistance that the rate of mortality from other causes among lepers is very high. The system of isolation and withdrawing lepers from the thickly populated communities has been at once justified by the reduction in the number of new cases. The number of known lepers in the archipelago on September 1, 1905, was 3,580; on June 30, 1907, it was 2,826, a decrease of 654, due to the death of the known lepers without any spread of the disease, as had been the case in previous years and under different conditions. The policy of removal of lepers is one which can only be carried out gradually and has been applied only to a part of the provinces, but it will probably be completed in three or four years, when all the lepers will be removed to Culion, and the effect of this isolation will certainly be to reduce the infection of healthful persons with the awful disease to a minimum.

RAILROADS IN THE PHILIPPINES

In my last annual report I set forth in detail the concessions granted for the construction of railroads in Luzon, Panay, Cebu, and Negros, and showed that within five years we might expect that, instead of a single line of railway 120 miles in length, which was all that we found when we occupied the islands, we would have a system with a mileage of 1,000 miles. Work has gone on in full compliance with the terms of the concessions of the two companies.

Only one of these companies took advantage of the provision for the guaranty of bonds, and they have built about 40 miles of road and have earned, under the terms of the concession, the guaranty of $973,000 of bonds, which has already been signed and delivered by the Philippine government. Of course, in this financial panic these companies are likely to have difficulty in securing investors in their securities.

The roads as constructed have been well constructed, and are admirably adapted to resist the climatic conditions in the islands. There is no reason in my judgment why these roads, when constructed, should not pay a reasonable percentage upon the investment. It is of the utmost difficulty to secure the coming of capital to the islands, and it would greatly aid us if the dividends earned by these roads were very large. In the Orient two-thirds of the income of railways comes from passenger earnings and one-third from freight. Of course, the railroads are very essential to the agricultural interests of the country and will directly affect the amount of exports of agricultural products, so we may count on a steady increase in the freight receipts from the moment of their beginning operation. As I say, however, the chief hope for profit in the railways is in the passenger traffic.

In the three Visayas, in which the railroads are to be constructed, the density of

population is about 160 per square mile, whereas the average population per square mile in the United States in 1900 was but 26. The Island of Cebu has a population of 336 per square mile, or a greater density than Japan, France, Germany, or British India. It is, therefore, reasonable to suppose that the passenger earnings on these railroads will be very large.

THE FILIPINO LABORER IMPROVING

It was anticipated that the labor problem would be a difficult one to solve in the construction of these roads. This has not proved to be true. The Philippine labor has shown itself capable of instruction, and by proper treatment of being made constant in its application. Of course, the prices of labor have largely increased, but the companies constructing the roads have found it wise to increase wages, and thereby secure greater efficiency. Even with increased wages the cost of unit of result is less in the Philippines in the construction of railways than it is in the United States.

I do not hesitate to prophesy that during the next twenty-five years a development will take place in the agricultural and other business of the Philippine Islands which will be as remarkable in its benefits to the United States and the Philippine Islands as was the development of Alaska during the last ten or fifteen years. Hope of this is not what has actuated the government in pursuing the policy that it has pursued in the development of the islands, but this is as inevitable a result as if it had been directly sought, and perhaps the absence of selfishness in the development of the islands is a greater assurance of profitable return than if business exploitation by the United States had been the chief and sole motive. The growth in the production of hemp and other fiber products, in cocoanuts, in rubber and many other tropical crops, and in peculiar manufactures of the islands may be looked forward to with certainty.

The city of Manila has not been given autonomous government. It is under the control of a municipal board of five persons appointed by the central government, and is governed, therefore, as Washington or the City of Mexico is governed. In the proper improvement of Manila some six or eight millions of dollars had to be expended, and much business experience and foresight were required to build the new water works and the new sewer system, to repave the streets, to canalize the esteros, or creeks, to organize an effective police force and a new fire department. It was thought that it would not be safe to intrust the conduct of such important business matters to a body selected by the electorate of Manila for the first time. The city of Manila has been well governed. Very large sums of money have been expended in most extensive improvements, and not the slightest scandal or dishonesty has been charged in any of the city administration. It has offered a most useful model for other municipalities in the islands to follow and has lent engineers, policemen, and firemen to other towns to help the latter to better organization.

There is no city in the world better governed than Manila. The streets are well cleaned, are well policed, there is a most excellent fire department, the parks are being enlarged and improved, the street-car system is as good as anywhere, and with the improvements in the water supply the sewerage system and esteros or canals, which are now under foot and part of which are quite near accomplished, the face which the Filipinos turn toward the world in the city of Manila will be a most pleasing one.

A BEAR HUNT IN MONTANA

By Arthur Alvord Stiles

Topographer, U. S. Geological Survey

WITH the end of the hunting season in the Far West there comes to light a true and exciting bear story—one that well might have made the bravest hunter look to his safety, or even have thrilled the sportsman spirit of President Roosevelt himself.

The incident occurred last September in the forest of northwestern Montana. The party consisted of Dr Charles B. Penrose, a well-known physician of Philadelphia, the victim of bruin's ferocious attack, and his two brothers, Spencer Penrose, of Colorado Springs, and Senator Bois Penrose, of Pennsylvania, now in Washington. The party had spent the early part of the season exploring a section of the Lewis and Clark Forest Reserve, where trails were to be found and where travel with the pack-horses was comparatively easy. Toward the end of the summer, however, Senator Penrose desired to see a part of the country hitherto unsurveyed and without trails or passways of any kind. It is a section of high and rugged mountain peaks, snowfields, and living glaciers, wholly uninhabited except by the wild animals, and wellnigh inaccessible save in the dead of winter, when some adventurous soul of doubtful judgment might make his way thither on snowshoes.

As it happened, a small party of topographical surveyors of the U. S. Geological Survey was then penetrating into this God-forsaken region, carrying with them their pack-train of mules, camp equipment, and map-making instruments. This was the first pack outfit of any kind to enter into the territory. Senator Penrose and his brothers joined the government party, and by them were conducted well up among the snow-capped peaks of the range.

Continued bad weather having stopped the work of the surveyors and made all mapping impossible, the writer, who was chief of the government party, offered to take Senator Penrose out for a hunt. The Senator and his younger brother, however, were tired out with the long and difficult journey to the government camp, so Dr Penrose, who had endured the hard climb better than his brothers, volunteered to accompany me to a distant glacier basin, where they expected to find big game. The saddle horses were left at the head of this basin, and, little knowing of the fate that awaited them, the two men separated.

I had just sighted a fine buck deer and was on the point of creeping away from it so that Dr Penrose might come and kill it, when I heard three shots in rapid succession. I gave no special heed to the reports, which came from the other side of the ridge, and was about turning to shoot the deer myself, when I heard two more shots; a moment more and another report rang out. Immediately becoming alarmed, I ran back in the direction from whence the shots came. I suppose I reached the doctor in about five or ten minutes. As I came around a mass of broken boulders I saw Dr Penrose wandering aimlessly around in the canyon bed. He had no gun. His hat was gone, his coat torn off, and his trousers rent. Blood poured from his head and neck, and he gripped his left arm in his crimson right hand. When I reached him he murmured piteously, "Water, water." I ran and brought water in my big sombrero from the other side of the rocks. He drank it like a thirsty horse, and I thought I saw part of it run out through a gash in his cheek. Then he said: "Stiles, I am all in; I have had a fight with a bear."

With signal cloth I hurriedly began to tie up the worst of his wounds, and as I did so the picture and the bleeding man told me the story. A few rods down the gulch lay a grizzly cub, so large as to appear full-grown, except to the careful observer. Near by was the huge carcass

Photo by Robert H. Chapman and H. L. Baldwin

CHARACTERISTIC SCENE IN NORTHWESTERN MONTANA

Swan range looking south from west spur of Baptiste Peak

of a mother grizzly, and near her the doctor's Mauser rifle, cast aside and empty. All was plain now. In his excitement Dr Penrose had not noted that the bear which his first three shots had so promptly slain was yet a young cub, whose grief-stricken and enraged mother might then be making her way from the rocks and brush to avenge the death of her offspring. Going down to examine his prize, he placed his rifle on a rock, fortunately not far away.

He was stooping over the dead cub when there came from behind him a rush and an awful cry. He turned and saw the mother bear coming upon him, then not sixty feet away. With almost superhuman presence of mind Dr Penrose caught up his Mauser again and fired two shots into the enraged beast. Instantly he took from his pocket his last remaining cartridge, worked it into the rifle, and sent a third steel-jacketed bullet into the onrushing bear. Swift and sure as were the little bullets, the bear's fury was not checked in time. With one stroke of her paw she sent him into the gulch, eight feet below. She sprang down after him and caught him in her mouth and shook him as a cat might shake a mouse. She dropped him. Again she caught him up, his face between her glistening tusks. She tore his scalp; his eyes narrowly escaped. A tusk penetrated into his mouth from the side of his cheek; another tore open his throat. There were five gaping wounds in his chest. His thigh bore an awful, irregular tear, and the flesh hung in ragged pieces from the wound, half as wide as your hand. His left wrist was twisted and broken, and the bones stuck out through the quivering flesh. The bear tried once more to shake her half-dead victim, but she sickened with her own awful wounds, and, staggering, fell dead at his feet.

The little Mauser bullets, fired a moment before, had finally had their deadly effect, and by his steady nerve and accurate aim Dr Penrose had saved his own life. Had the beast lasted another half minute the doctor would have been with his fathers, and the little cub's death would have been avenged. But the heroic mother had fought to the last, and now, with her dead baby, lay quiet and still forever.

Recovering sufficiently, the bleeding man sat up and began to take stock. As he meditated thus, there came a new adversary. In actual fact, or in the suffering man's delirous fancy—I have never known which—a third bear bounded out of the brush from another direction. The doctor's heart sank; he could make no resistance now; he hoped that death might come quickly. The new enemy approached to close quarters, and, walking around, snarled and growled savagely, yet was evidently undecided what to do. Then, with a cry of mingled rage and fright, it dashed off down the gulch and was lost in the forest.

The journey back to camp was difficult and dangerous, but the suffering doctor, who now began to realize his frightful condition, was bearing up bravely. Wrapping my big cow-boy slicker around him, I managed to get him on my horse, and we turned back to the camp, where we had left the Penrose party. My faithful horse did his duty nobly, as we climbed and stumbled along for two hours without a trail, at last reaching the teepees at nightfall. The unexpected sight of the wounded and bleeding doctor somewhat demoralized the group of waiting men, and after some delay a pine-knot camp-fire was made for light, and with the patient lying at full length on the ground I began my surgical operations, assisted by such much-needed instruction as the doctor, in his awful pain, could give me while the work progressed. I applied antiseptics and placed bandages, all of which happily he had with him in a small emergency case. Finally the broken wrist was reached. It was agreed that I should remove the protruding bones, the nervy patient thinking he could endure the pain of the operation without anesthetics. I disinfected the little knives and appliances and the last operation began. The pain was awful. With one agonized groan the man gave up for the first time. We held a hurried conference. The wrist would have to be left as it was, and we bound it up once more in signal cloth. It

Photos by Robert H. Chapman and H. L. Baldwin

TYPICAL VIEWS IN NORTHWESTERN MONTANA

Showing barren and rugged peaks and heavily-forested valleys

Photos by Robert H. Chapman and H. L. Baldwin

PACK-TRAIN CROSSING THE RANGE

View from Kootenai Mountain, looking south

was one o'clock in the morning when I finished my amateur surgery. Thoroughly distracted by the sight of their brother's suffering, Senator Penrose and Spencer withdrew to another tent, and I lay down near Dr Penrose to wait for dawn.

My life on the frontier has been full of trying episodes, but oh, that night! How would we get Dr Penrose out of the mountains? I dare not guess how many times I asked myself that question. As the gloomy hours dragged by I listened to the heavy breathing of the man whose nerve and fortitude I had already come to admire, now asleep and groggy with the morphine injected to stop his unbearable suffering.

To go back the way we came up would mean two days and a 600-foot climb on foot. He could not last. By the second day we would be packing out a dead body. Yet there was no other route. The situation was desperate. In the lonely flickering of that camp-fire I meditated, and my sympathies went out to that wounded man. As the case presented itself at that moment success in guiding the party to the railroad meant the doctor's life, if not his comfort; failure meant death, simply. Before that welcome dawn had come I decided to run a hazard. We would take Dr Penrose to the railroad by an unheard of route. Providence might point the way.

At dawn the little caravan started. Again the big black horse carried the almost helpless doctor, Senator Penrose and Spencer walking on either side to steady their brother through the tight places. The faithful guide, Bill Hague, lead the extra "packs," and two young men from the Survey party, Malcolm Force, of Montclair, New Jersey, and Billy Kemeys, of Washington, D. C., worked as axemen. Thus, for eleven hours, we climbed down, down, down, five miles through the forest and jungle, cutting our way as we went. At dark we dropped through to the railroad, completely exhausted, but safe. Our route had proved successful. I could not have cut another tree or broken another brush, and my two Survey boys had stood by me like men.

Quickly we conducted Dr Penrose to a lonely section-house two miles down the track, where the Great Northern Limited was flagged, and he was taken away to Minnesota, where, three days later, he was operated upon by the surgeons at the Mayo Hospital. Since then he has retired to his country home near Philadelphia. Though his recovery is not yet complete, his progress has been very remarkable.

As a memento of the encounter with the bear, Dr Penrose has presented the writer with a beautiful Mauser rifle, imported from the Krupp works at Essen, Germany. In the stock of the rifle is set a little silver nameplate which bears the simple inscription: "Arthur Stiles, from C. B. Penrose."

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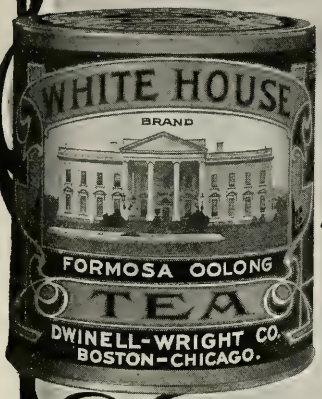

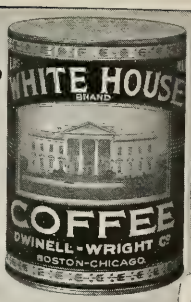

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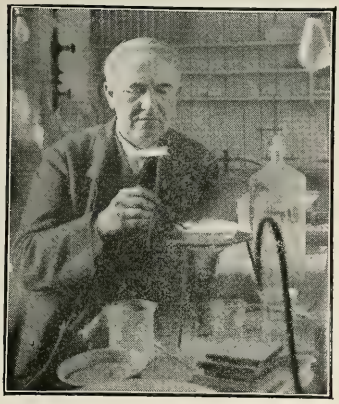

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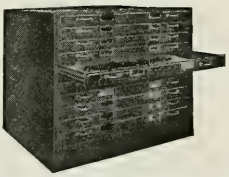

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The NATIONAL GEOGRAPHIC MAGAZINE

Vol. XIX MARCH, 1908 No. 3

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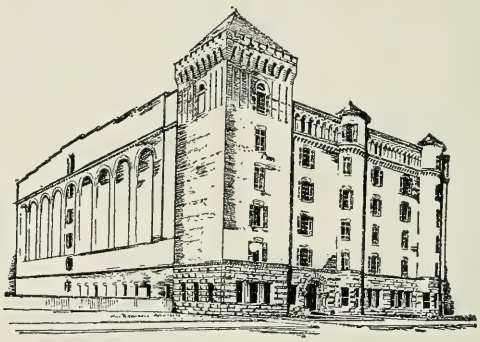

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VOL. XIX, No. 3 WASHINGTON MARCH, 1908

THE NATIONAL GEOGRAPHIC MAGAZINE

A JOURNEY THROUGH THE EASTERN PORTION OF THE CONGO STATE*

BY MAJOR P. H. G. POWELL-COTTON

MY principal quest in my recent journey to the Congo State was the northern white rhino, known only by a single specimen, shot by its discoverer, Major Gibbons, and eventually sent to America. My search for the animal, and for a couple of elephants standing as near 12 feet in height as possible, occupied five and a half months. During this time I made the Congo stations along the Nile my headquarters for short expeditions westward into the plain. All these posts are malarious and swarm with mosquitoes—Kiro, the most picturesque of them all, being literally infested. In fact, the Enclave generally must rank among the most unhealthy districts of Central Africa; in one year the death-rate among the Europeans rose to over 20 per cent.

On my arrival at Lado, the chief station on the White Nile, in the latter part of December, and throughout the first fortnight of January (the dry season), the heat was intense, the thermometer standing as high as 104° in my tent at 2 p. m. Once away from the Nile, the scarcity of water proved a great difficulty. Stagnant pools in the river beds, fouled by man and beast, and these only at rare intervals, formed the sole supply. In the rainy season so much of the country lies under water that traveling is almost impossible. Owing to the flatness of the thorn-dotted plain, Lado Hill forms a conspicuous landmark for many miles. This district is peopled by the Bari, a peculiar feature of whose huts is the floor, sunk 18 inches below the surface of the ground—a method of construction which appears particularly curious in view of the heavy rainy season.

As my caravan moved farther southward I was struck by the numerous ruins of villages and almost continuous stretches of what had once been cultivated ground. It was evident that at no very distant date, probably before the dervish raids had devastated the country, it must have supported a considerable population. Much of the ground had been terraced and cleared of stones. The village sites were marked by numerous circles, some 6 yards in diameter, formed of wide, thin stones set upright and standing some 18 inches to 2 feet above the surface. The top of each of these stones was nicked to receive the end of a

*An address to the Royal Geographical Society, and published in this Magazine through the courtesy of the *Geographical Journal* (London).

roof-pole. Here and there a double circle of stones denoted a hut built after the form of the modern Abyssinian tucal, with a passage round it. Judging from a few higher stones still standing, these villages had evidently been surrounded by a palisade. At the present time the population is scanty, so that considerable difficulty is found in provisioning the stations. The greater part of the grain for my men had to be drawn from a district several days east of the Nile, on the Uganda side.

PRIMITIVE BLACKSMITHS

Working southward from Rejaf, I struck up the valley of the Kaya, where scattered settlements of nomad Bari plied the double trade of fishermen and blacksmiths. The women generally took their part in the work as well as the men. In little hollows on the flat surface of a rock, they would pound the filbert-like nuts of iron ore to powder. This was then carried to the smelting pits near by, grass-roofed constructions shaped like the letter V and encircled in heaps of dross and charcoal. Here and there couples of men were hard at work forging hoes, one of them beating the mass of glowing metal into shape with two stones, to serve the purpose of hammer and anvil, while his companion plied the bellows. One of the blacksmiths told me that the iron ore is collected from the surface of the ground at a place ten days distant. When the hoes are completed they are taken over to the great chief of the Bari tribe, on the Uganda side, who buys them for flour.

As the caravan drew nearer Wadelai, I found a stretch of country which proved to be the favorite haunt, at that time of year, of not only white rhino, but bull elephants. Here I was able to realize the two chief objects of my visit to the Enclave, by securing a complete skin and skeleton of a white rhino bull and the hides of two elephants nearly 12 feet in height. One of these latter was destined for the British Natural History Museum, whose director had been trying to procure such a specimen for the last three years. The other I proposed presenting to the Tervueren Museum near Brussels. The preservation of these skins gave great trouble, but they were eventually sent off in good condition to Kampala, which place, thanks to the courtesy of the late Mr Fowler, sub-commissioner Nile provinces and collector at Hoima, they reached in excellent time. But unfortunately, for some reason yet to be explained, the skins were afterwards detained so long that the lake-shore climate completely ruined them, to the loss of the museums and to my disgust, for there was a heavy bill of carriage to pay. When two years previously, in 1903, I traversed the country between Wadelai and Mahagi Bay, at the northwestern corner of Lake Albert, it was practically depopulated, for the villagers had moved over to the Uganda side. Now, to my surprise, I found new villages being established all along the route, the natives having returned to escape the Uganda hut-tax.

From Mahagi Bay station we pushed our way up the hills to Mahagi proper, lying 4¾ hours from the lake and 1,180 feet above it. Here, as in all other stations I had visited, great improvements were to be seen. New brick houses had been constructed and stretches of bush had been cleared to give place to vegetable gardens and cultivation. My route now led over the Nile-Congo watershed, a series of rolling grass hills intersected by running streams fringed with belts of timber. My highest camp was at Mongolula, at an elevation of 5,950 feet. This region is for the greater part very sparsely inhabited and gives promise of one day becoming a valuable grazing ground for white settlers. Through Irumu bands of natives were passing on their way to the Kilo gold mines, where work on the alluvial deposits has been successfully commenced, some 35 ounces of gold being washed per day.

The Ituri River, a day's journey from Irumu, forms the dividing line between the grass land and the great forest. When my canoe had almost crossed the clear, rapid waters, 150 yards wide, I

MAJOR POWELL-COTTON WITH TWO OF HIS PYGMY TRACKERS

noticed on the opposite bank two miniature houses built close to the edge and resembling in every feature the huts of the villagers. The old chief was loth to explain the object of these houses, but at length I was told that they were erected for the shade of his predecessor, who was told that he must recompense them for their labors by guarding the passage of those crossing the river. From that time, whenever a caravan was seen to approach the bank a little food would be carried down to the ghost-houses as a warning that the shade's protection was needed for the caravan about to cross.

THE GREAT FOREST

The great Ituri forest, rendered famous by Stanley's remarkable journey across it, differed greatly from the dismal miasmic place of my imagination, where unhealthy mists and perpetual twilight reigned supreme. Far from shutting out the sunshine, the lofty dome of interlaced branches above our heads only served to soften the pitiless heat of the equatorial sun. Myriads of little sunbeams filtered through the leaves, to settle on the undergrowth in bright patches of light, where the butterflies and birds loved to flit to and fro. In the morning, it is true, the foliage would often be heavy with dewdrops and gossamer, but before eight the sunbeams had lifted the mists from the dense undergrowth, the giant trees, and the graceful creepers that flung their fantastic coils and festoons from branch to branch and from tree to tree. It was in the early morning that one felt the hush of the great forest, whose impressive stillness was only broken by the crackling of the sticks under the feet of our caravan. Here and there in the forest are little natural glades, called by the natives "eddos," some watered by sluggish marshy streams that almost lose themselves in the rich grass, while in others the waters rush and tumble over the clear quartz sand-beds and among moss-grown boulders. Dark tunnels, worn through the undergrowth by generations of beasts on their way to water, lead down to these rifts in the dense vegetation; for it is here that the beasts of the forest, from

A GROUP OF PYGMIES

elephant to the timid little dik-dik, come down to drink, bathe, and crop the fine grass at the water's edge.

The seasons in the forest are very ill-defined. Generally rain falls on four or five days of every week, while seven days without a thunderstorm was the longest dry period I experienced. In any big clearing it was curious to hear a storm coming up, for the sound of the drops pattering on the leaves of the trees reached us long before the rain. The roar of a hurricane through the forest was an experience never to be forgotten. Our camp was nearly wrecked on one occasion, and a passage several hundred yards wide was cleared through the trees for a distance of some miles. In 1905 I was in the forest from the last few days of June to the first half of August, while in the following year I spent from the last week of January to the first days of August in practically the same districts. July of 1905, passed between Irumu and Mawambi, was by far the wettest month of the ten. The following July, however, spent between Makala, Mawambi, and towards Beni, was one of the driest. While the forest is damp, I came across but very few boggy places and no large marshes. Mosquitoes are almost unknown.

THE DENIZENS OF THE FOREST

The population of the forest is numerous, from the pygmies, considered to be the most savage and primitive, to the Mongwana, the followers and descendants of the Arab ivory and slave dealers, to whom a certain amount of Moslem civilization and handicraft have been handed down; and dotted about at wide intervals, the neat, well-ordered stations of the Congo government gave evidence of a European civilization that has crushed Mongwana power and effectually abolished the slave trade.

The climate of the forest seems to have no detrimental influence on the physical development of any of the tribes who find their home under its shelter. The Mongwana are a tall, well-proportioned race of

A FOREST GIANT, WITH TENT BETWEEN TWO EMBEDDED ROOTS

men, and many of the women seem to have inherited a certain Arab grace of form. The Babila, another tribe with which I came in contact, although short of stature, are a sturdy, healthy-looking race, while the pygmies certainly show no signs of physical degeneration. But the native from the plain, or the white man, usually suffers severely after a few months' residence in the damp atmosphere of the forest, rheumatism, dysentery, and bilious fevers being the most common complaints.

The soil of the forest is so rich in leaf mold that it produces two to three crops a year. Like the natives, the villagers are in the habit of continually changing their cultivation from one spot to another, although here it necessitates a great deal of labor. The underwood and saplings are first all cut down, and then attention is turned to the smaller trees, which are felled some 8 feet from the base, and left to cumber the ground where they fall. By this time the underwood is sufficiently dry to help in the destruction of the larger trees that are alone left standing. Piling it around the trunks, the natives set it alight in order to burn the bark, and thus kill the trees, which eventually stretch out their gaunt arms over crops of banana, millet, rice, maize, sweet potatoes, and manioc.

Grass in the forest can only be found in the eddos, and in the clearings made by the natives for their gardens. For this reason there are no cows, and the few imported sheep and goats that manage to withstand the hardships of the march through the forest to the villages are cherished by the owners as their most precious possessions. Among the little flock that followed us on our journey, the death-rate in the forest was over 50 per cent, and this in spite of every care. Night after night, a platform strewn with leaves was built for them, with a roof as shelter, and during the march each animal had a nose-bag with a few potatoes in the bottom, to prevent them getting hungry or eating poisonous leaves from the undergrowth.

FLOATING VILLAGE OF KATANGA, AS SEEN FROM THE SHORE

On the site of an abandoned garden vegetation rapidly springs up, to form a favorite haunt of elephant, buffalo, wild pig, bush-buck, bongo—an animal even rarer in the Ituri forest than the okapi—and leopards, which latter are, curiously enough, never to be found far from a native settlement. In coloration the animals of the forest have a tendency to become darker in shade than those of the plains. A notable example of this is the ratel (*Mellivora cottoni*), which is entirely black, while in the south and west of Africa the whole upper surface of the body, head, and tail are an ashy gray.

Mica abounds in the neighborhood of Mawambi, and the whitewash used for the houses in the post is so full of minute fragments that the walls sparkle in the sunshine.

THE PYGMIES

This station is a great center of the pygmies. They live in small communities of six to eighteen men, with their wives and families. Each group is governed by an elder, but there does not appear to be any recognized supreme chief, and the communities are often at war with one another. They have no permanent villages; their low primitive huts, thatched with the large leaf of *Sarcophrynium arnoldianum,* are built in a little clearing in the forest, and are moved, not only for their customary biannual migration, or when hunting in that district is becoming difficult, but also on the death of any member of the group, or also when they have killed some large animal. It is easier, in the latter case, to move the village to the animal than it is to move the animal to the village. Their time is passed in hunting and collecting honey, wild fruits, and roots. While they kill the larger animals, even elephants at times, with a short-shafted, broad-bladed spear, by far the greater quantity of their game is taken by driving it into nets.

The pygmy is a most expert climber, and no matter how high the wild bees may have their nest, he will scale up and cut it out in an incredibly short space of time. Each group of pygmies attaches itself to the chief of one of the other forest tribes, whom they supply with meat,

THREE HUTS OF THE FLOATING VILLAGE, KATANGA

honey, creepers as ropes, and leaves for thatching in exchange for vegetable produce. Tilling the ground is an occupation regarded with scorn by the true pygmy. Bows and arrows are his weapons of war. With these he is a skilled marksman, for he is constantly practicing on monkeys and other small beasts. All the ironwork used by a pygmy is traded from other tribes. Bark cloth dyed terra-cotta or a soft gray is his principal manufacture, but he also makes wooden honey-pots, pipestems, bows and arrows, together with personal ornaments of fur and feather, and sleeping mats of skin. The dances of the pygmies are the most interesting of any I have seen, and are carried on with great energy and enthusiasm for hours at a stretch. Nearly all of them portray some feature of a hunt, and end up with the feast that follows its success.

A FLOATING ISLAND

Katanga was the most southerly point we touched. This village was one of the most curious I have ever visited. The main group of thirty huts was built on one huge floating platform some little distance out on the waters of a sheltered bay. The platform rises and falls with the surface of the lake, being moored by poles driven into the mud. The villagers are a robust, well-built race, in spite of constant intermarriage, for the men never choose their wives from among the women of the plains. They subsist by hippo hunting and fishing, carrying on a lucrative trade by the purchase of salt from Katwi to exchange for sheep at the southern end of the lake.

WALL OF BURNT CLAY SURROUNDING A VILLAGE NEAR TIMBUKTU, AFRICA

NATIVES NEAR TIMBUKTU, IN THE VALLEY OF THE NIGER

A YOUNG GIRL, NEAR TIMBUKTU

A NATIVE HUT SHOWING BURNT CLAY WALL—SCENES IN FRENCH TERRITORY IN THE VALLEY OF THE NIGER

GRANARY IN THE VALLEY OF THE NIGER

For this and the preceding four illustrations this Magazine is indebted to "La Société d'Etudes Coloniales de Belgique," Brussels.

IN THE VALLEY OF THE NIGER

THE French during recent years have been sending many expeditions across the Sahara Desert and have thoroughly explored Timbuktu, formerly the mysterious city of Africa, and all the country round about it. They have found there queer types of architecture and relics of a civilization which centuries ago was very great. They have also discovered in caves exceedingly ancient human relics, showing that this part of the world was inhabited during the Stone Age by a people not unlike the prehistoric Cliff-dwellers of this country.

But perhaps the most interesting result of these expeditions is the apparent proof that the Desert of Sahara is constantly growing larger by pressing southward. The region along the upper Niger and east to Lake Tchad is becoming dryer each year, with the result that the arid belt across Africa is widening. This gradual desiccation resembles that occurring in central Asia, and is the principal reason for the degeneracy of the peoples along the Niger. The NATIONAL GEOGRAPHIC MAGAZINE has in preparation a large map of Africa, which will be sent to the members of the Society in about two months.

MAKING CASSAVA BREAD, SAINT VINCENT, WEST INDIES

Cassava is a native plant of tropical America, but has been extensively introduced into Africa and other tropical countries. It grows in bush form, usually six or eight feet high, and its roots, which grow in clusters, vary in size from a few inches to three feet long, and sometimes weigh as much as twenty-five pounds. Cassava roots form the principal food of the common people in tropical America. It is generally handled commercially in the form of meal, somewhat resembling oatmeal, but is made into thin, round cakes by the natives, known as cassava bread. The meal is exported from some parts of the West Indies to Europe, where it is used in manufactories as starch, and is also formed into tapioca. The series of illustrations of making bread, pages 165–179, are from photographs by the Keystone View Co., and are copyrighted by them.

MAKING TORTILLAS, SALVADOR, CENTRAL AMERICA

Tortillas are prepared from Indian corn, which is first parboiled to make it clean and soft. The meal is then crushed into a paste with a stone rolling pin on a small stone table, as in this picture, after which it is baked on a plate of iron or earthenware, but not enough to brown the tortilla, which is served hot. Copyrighted by the Keystone View Co.

TORTILLA MARKET, GUADALUPE, MEXICO

One of the strange customs noticed by Americans in Mexico is that the natives are almost constantly eating from morning until night. Wherever a train stops there are men, women, and children selling boiled eggs, fried chicken, and many dishes distinctly Mexican, all generally seasoned with Chile and other acrid spices; native cakes (tortillas), perhaps prepared and cooked at the train side, are also to be had, and there, too, may always be found the senorita with her bottle of pulque. At the market a large portion of the purchases are for immediate consumption; hence, as shown in this view, women are always present with a handful of dough and portable charcoal stoves, supplying hot tamales and tortillas. This view shows the tortilla-makers as they appear on Sundays and feast days in front of the Cathedral Guadalupe. Copyrighted by the Keystone View Co.

A BREAD "WALLAH," JEYPORE, INDIA

These round, flat cakes of unleavened bread are more like pancakes than any other article of food in common use among us. The cakes are called chapatties. The cook shapes them between his hands and bakes them on a griddle or on the coals. They are made of wheat flour, and are a common article of diet among the well-to-do classes in central and northern India. The poorer people eat cake made of corn meal, millet, and a coarse, hard grain called raggy. In western India barley cakes are eaten to some extent. In the south boiled rice is made into cakes known as hoppers, which is the Anglo-Indian rendering of the Tamil appa. Copyrighted by the Keystone View Co.

A BAKERY IN JAPAN

Old Japan had no bread or biscuits. Rice, beans, fish, eggs, and millet were and are the chief articles of food. The Japanese knowledge of bread dates from their acquaintance with the Portuguese, who first entered Japan in 1542. In 1890 there was a rage for foreign bread in Tokyo, even among Jinrikisha men and cooliês. Piles of loaves were seen at every little cook-stall; but the fashion subsided like a fever and ordinary Japanese victuals resumed their wonted place. Biscuits such as we see in this view are a compromise between oriental and occidental cookery. They are of various kinds, made of rice or of wheat flour and baked over a charcoal fire. Copyrighted by the Keystone View Co.

TWO WOMEN GRINDING AT THE MILL—PALESTINE

Wheat is sown, reaped, and ground in Palestine and Syria by the same primitive methods used 2,000 years ago. Copyrighted by the Keystone View Co.

BAKING BREAD IN SYRIA

The hearth is simply two stones raised on end, over which an iron plate is laid, on which the bread is baked. Copyrighted by the Keystone View Co.

BREAD OF THE ORIENT, EGYPT, AND TURKEY

These loaves are not of such generous size as the reader may infer. Notice a loaf to the right, purposely crushed for this occasion. The material is first rolled out or pounded flat like pie dough and two layers successfully united at the edges. These are then placed in a hot oven, where they puff up and are baked in a remarkably short time. Copyrighted by the Keystone View Co.

AN OLD-FASHIONED BAKERY STILL USED IN SECTIONS OF CANADA AND THE UNITED STATES

This bakery resembles the New England oven of two generations ago. A week's supply of bread for a large farm household can be baked at one heating. Copyrighted by the Keystone View Co.

MAKING THE "FLAT BREAD" OF THE NORWEGIAN PEASANT

This Norwegian woman is baking the well-known flat bread under a little shelter of dried branches. The dough for this bread is in the shallow dish in front and to the left of the woman, and is made of coarse barley meal and water. After being rolled thin, it is removed to the round flat stone in the foreground, under which a fire of faggots is kept burning. Here it is baked, then laid on the pile on the opposite side of the picture. Copyrighted by the Keystone View Co.

MAKING THE "FLAT BREAD" OF THE NORWEGIAN PEASANT

This barley bread is stored in a dry place for the winter, when it forms one of the chief foods of the peasants. Though made in the most primitive fashion, it is usually clean and palatable. Copyrighted by the Keystone View Co.

Photo from Corby Bros., Washington, D. C.

THE LABORATORY OF AN AMERICAN BAKERY, WHERE ALL THE INGREDIENTS ARE CAREFULLY TESTED

MARKING THE ALASKAN BOUNDARY

UNUSUAL difficulties are being met and overcome in marking the Alaskan boundary as determined by the Boundary Tribunal at London in 1903. The shortness of the season in which the work can be done, the absence of all trails, the necessity of climbing almost inaccessible peaks, and the severe cold practically all the time have made the surveying of the boundary a very hard problem. The work is, however, being pushed vigorously by both the United States and Canadian governments.

The illustrations on pages 180-189 will give the reader an excellent idea of the region in which the work is being done. These illustrations are from photographs by Messrs Radcliffe Hordern and E. R. Martin, of the Alaskan Boundary Survey, and have been sent to this Magazine through the courtesy of Hon. O. H. Tittmann, Alaskan Boundary Commissioner for the United States.

Kate's Needle, whose peculiar profile is shown on page 180, is about 10,000 feet high, and is the highest mountain in southeastern Alaska outside of the Saint Elias and Mount Fairweather ranges. It is one of the boundary mountains selected by the Tribunal of London. Whichever of the pinnacles projecting above its summit ridge is chosen as the exact turning point in the boundary will be a grander and more enduring monument than any which can be built by human agency. The reader will note the remarkable profile of a female face with a striking head-dress.

The mountain is the source of great glaciers lying on its slopes, and from one of these in a most inaccessible region this photograph was taken by Mr Radcliffe Hordern, of the Alaskan Boundary Survey. The mountain is 8 miles west of the Stikine River and about 34 miles from Point Roberts at the mouth of the river.

The views on pages 181-189 were all taken by Mr Martin in the vicinity of Glacier Bay, Alaska.

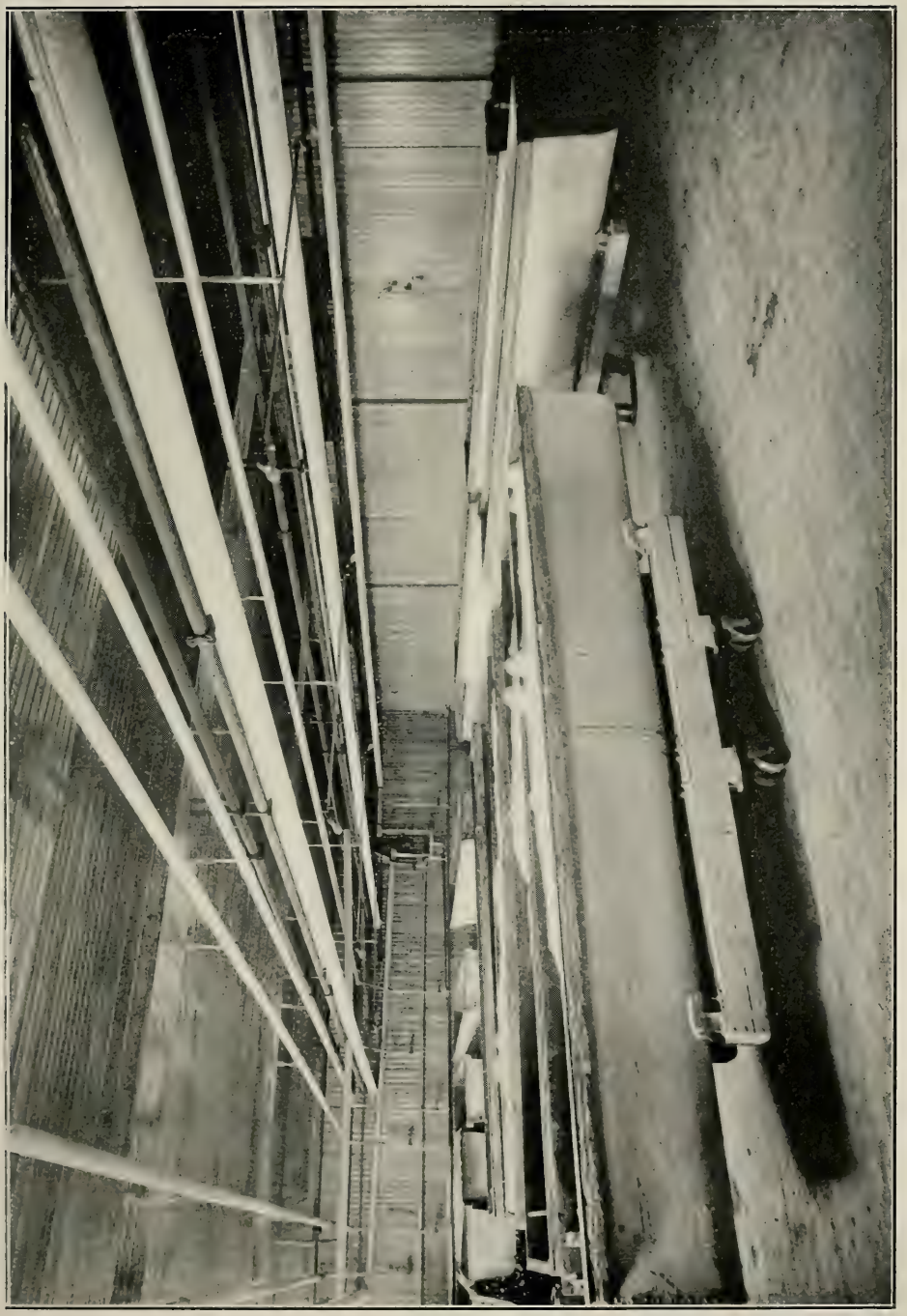


Photo from Corby Bros., Washington, D. C.

THE DOUGH ROOM OF AN AMERICAN BAKERY, WHERE THE FERMENTATION OF THE DOUGH IS DEVELOPED

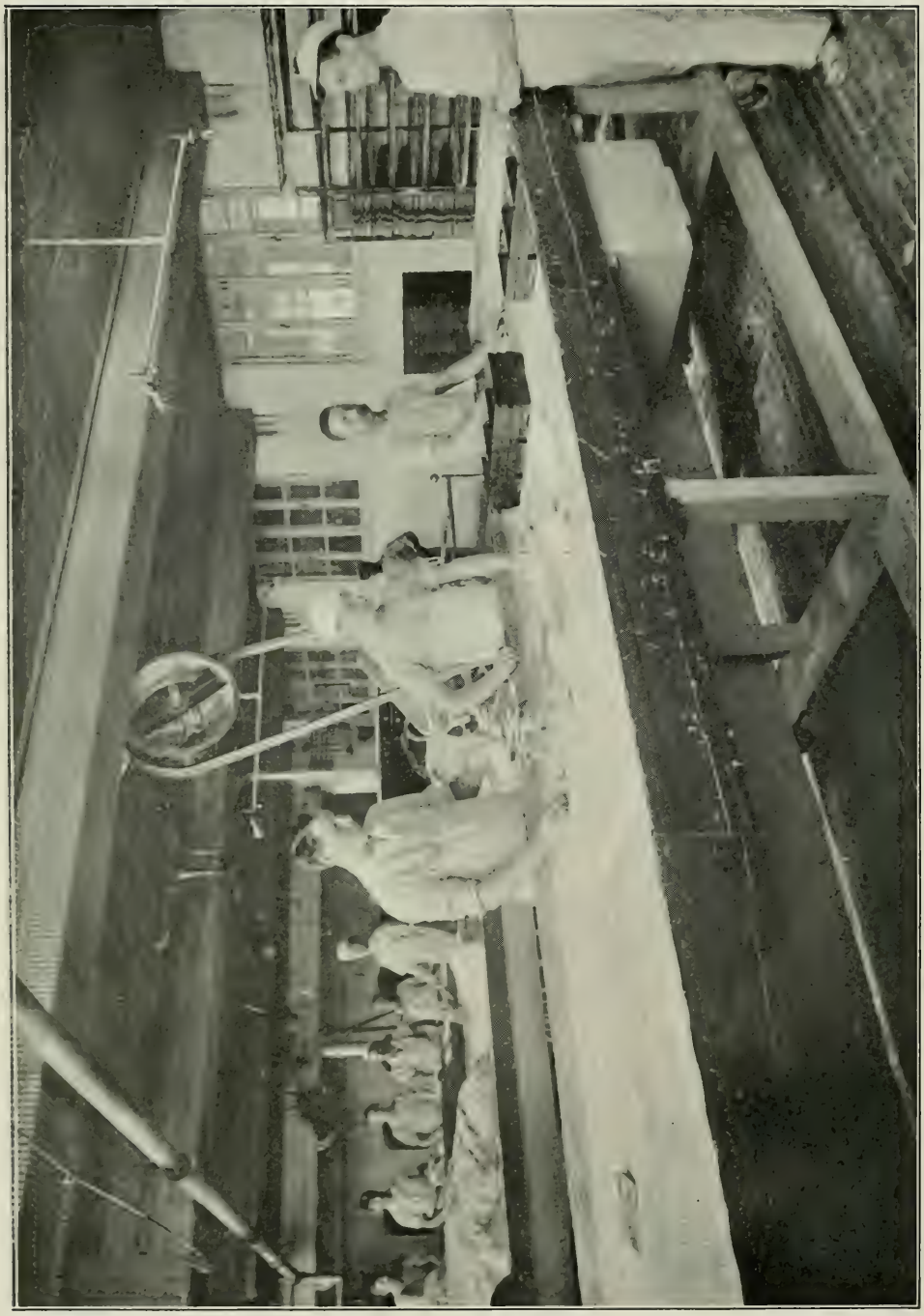


Photo from Corby Bros., Washington, D. C.

MOULDING THE LOAVES OF BREAD IN AN AMERICAN BAKERY

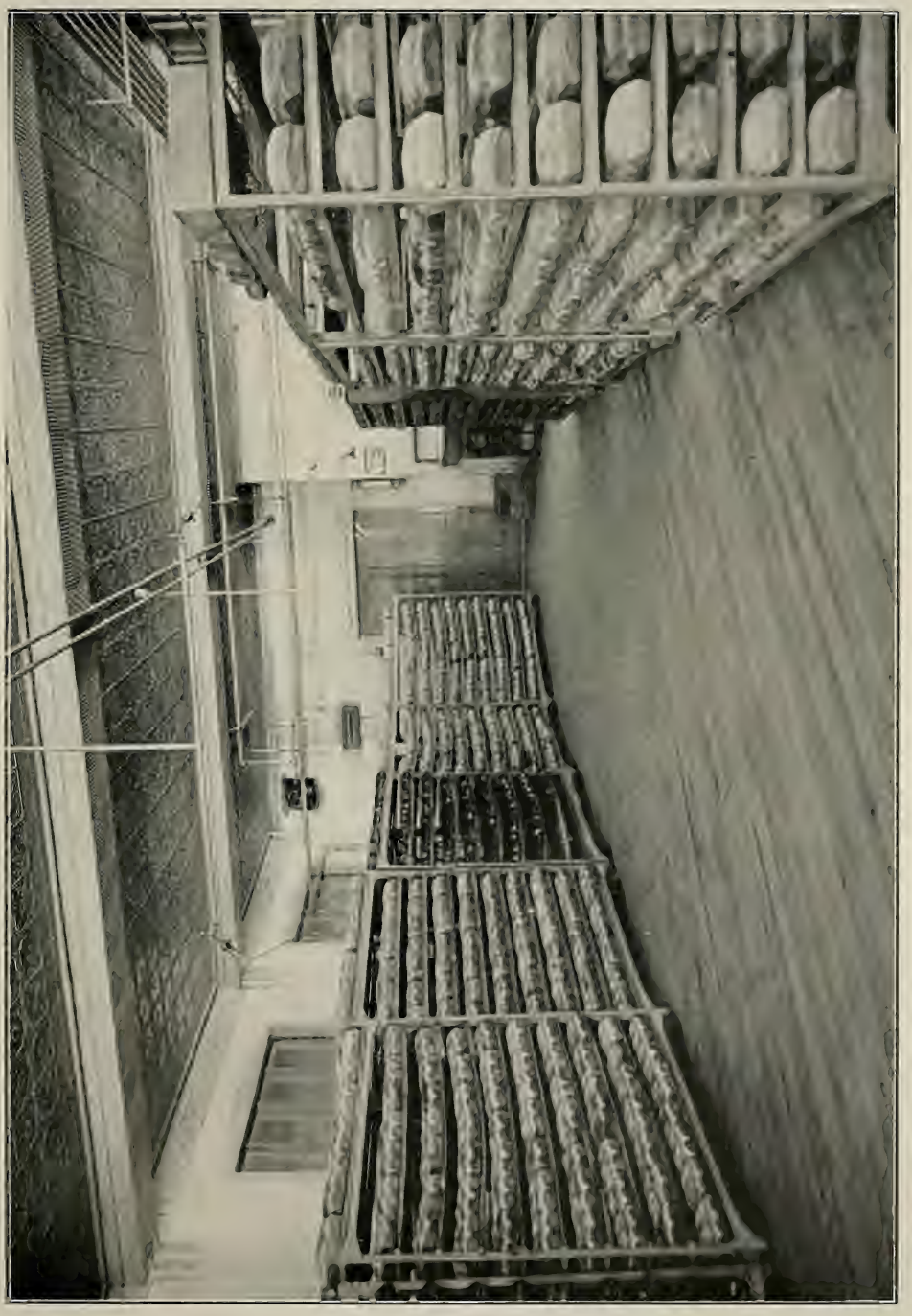


Photo from Corby Bros., Washington, D. C.

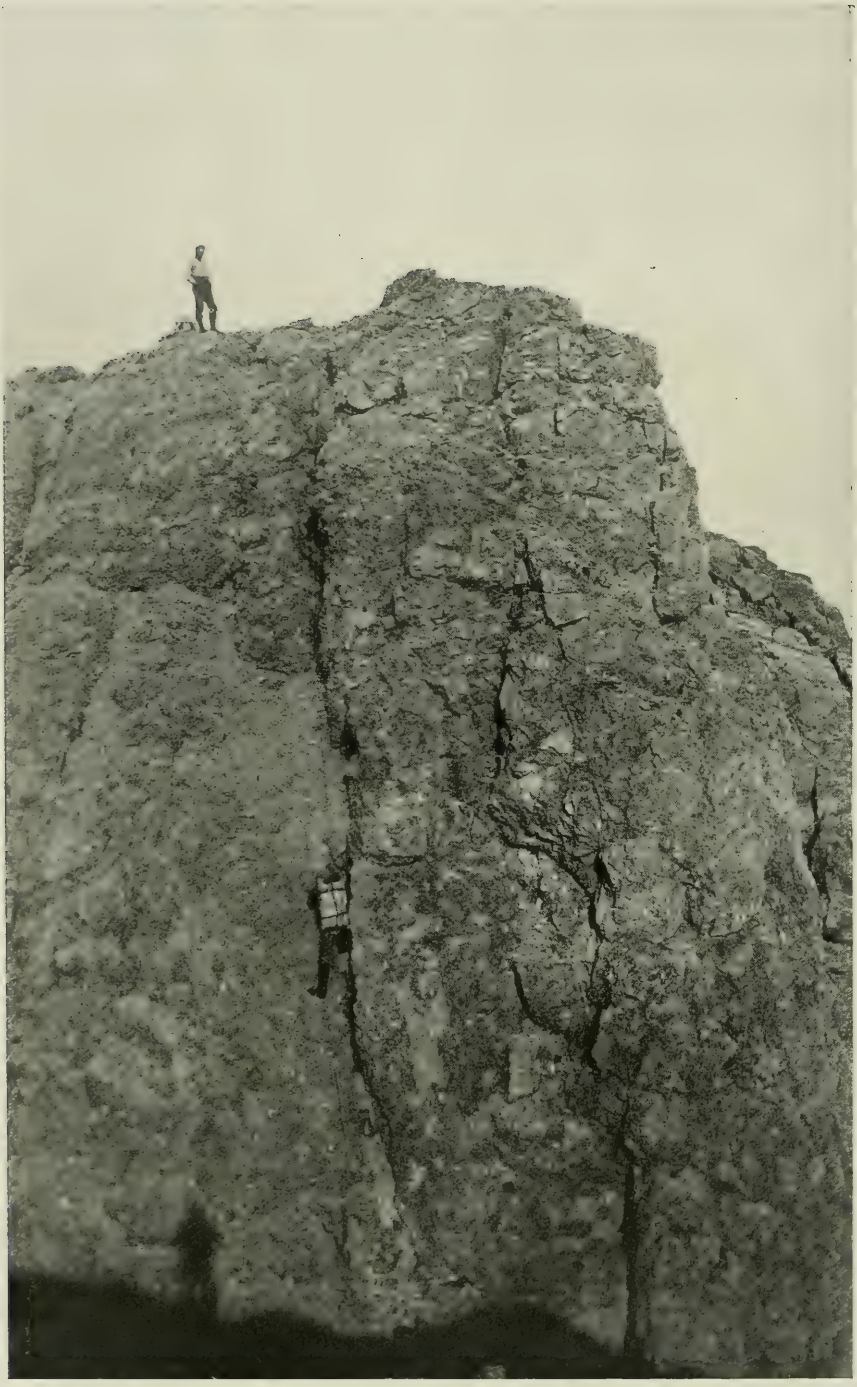
COOLING ROOM OF AN AMERICAN BAKERY, WHERE THOUSANDS OF LOAVES ARE COOLED BY FORCED AIR

KATES NEEDLE, ALASKA

Note the woman's face outlined by the profile of the mountain (see page 176). Photo by Radcliffe Hordern, Alaskan Boundary Commission

THE BRADY GLACIER

This view shows the face of the Brady Glacier in the upper end of Glacier Bay, and about 20 miles from the international boundary. This glacier runs through to the coast, sloping from its summit each way. No indication of recession was seen and its surface is so rough and broken up that it is quite impassable as far as observed. Photo by E. R. Martin, Alaskan Boundary Survey.



MARKING THE ALASKAN BOUNDARY

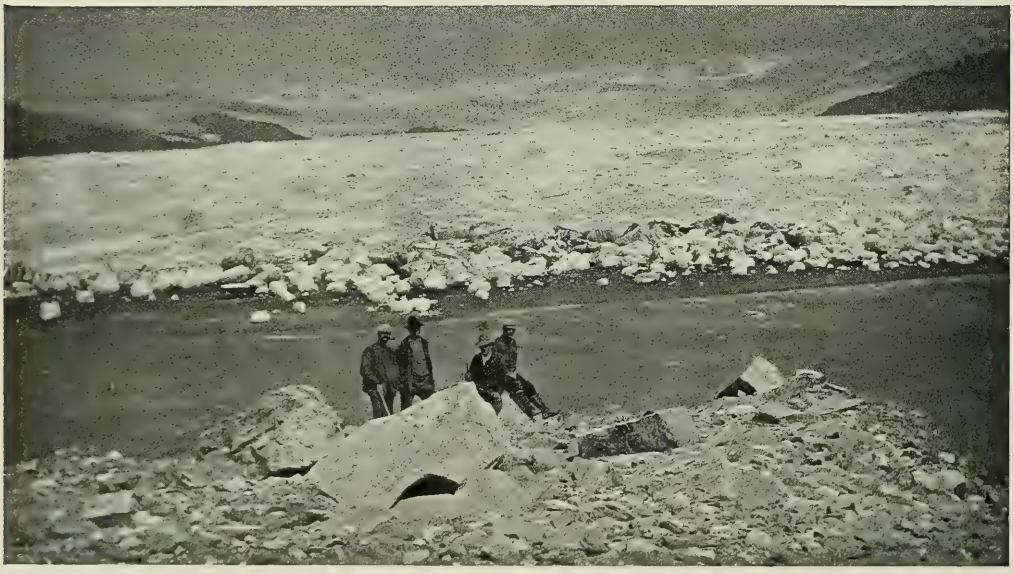
Some of the difficulties of triangulation. Climbing an almost vertical cliff by a rope. This cliff is almost 100 feet high, and affords the only means to reach the summit. The man on the rope has a theodolite on his back. This ascent had to be made five times before the necessary observations were completed. Photo by E. R. Martin, Alaskan Boundary Survey.

THE SURFACE OF THE "HUGH MILLER" GLACIER

No difficulty was found in traveling at will over this glacier

TRIANGULATION PARTY RETURNING FROM A TRIP TO A STATION NEAR THE MUIR GLACIER

This outfit spent fourteen successive hours working the boat through the floating ice. In eight of the fourteen hours no land was visible, and part of that time the bow of the boat was almost invisible from the stern. A dense fog covered everything, and the boat was navigated by a pocket compass. Some of the bergs were very large, and the fact that they break up and roll over without any apparent reason and without any warning, made this trip extremely dangerous. Photos by E. R. Martin, Alaskan Boundary Survey.



VIEW UP QUEEN INLET TOWARD THE BOUNDARY LINE—THE "CARROLL" GLACIER SHOWS IN THE BACKGROUND

The field of floating ice in front of the Muir Glacier and small bergs left on the beach by falling tides. The Muir Glacier formerly faced about where the group of men are seen, and had solid frontage clear across the inlet about 100 feet high. Now it is back several miles and slopes gradually down to the water. The earthquake of 1899 probably caused the ice to break off more rapidly than it usually did. Its former great beauty is now lost. Photos by E. R. Martin, Alaskan Boundary Survey.

A VIEW SHOWING HOW A SURVEYOR SHOULD BE SHOD WHO HAS MUCH TRAVELING TO DO ON ICE

AN OBSERVING PARTY CLIMBING A VERY STEEP SLOPE TO A TRIANGULATION STATION

Good solid footing made this ascent quite easy and rapid. Photos by F. R. Martin, Alaskan Boundary Survey

SILK SLEEPING TENT, WEIGHT ABOUT 8 POUNDS, 9 X 10, SHOWING COTS AND SLEEPING BAGS

A TRIANGULATION PARTY EATING LUNCH ON A MOUNTAIN TOP

Not much style, but plenty of tea and substantials. Photos by E. R. Martin, Alaskan Boundary Survey

AN OBSERVING PARTY RETURNING TO CAMP FROM A TRIANGULATION STATION ON A SNOW FIELD WHICH IS A LITTLE SOFT FROM THE ACTION OF THE SUN

"CAMP DIVERSION"

The chief of parties feeding the pet of the outfit. A triangulation station signal and cairn, with the cook tent in the background. Photos by E. R. Martin, Alaskan Boundary Survey

SUNSET VIEWS IN JULY

These views were taken between 9.30 and 10.30 P. M. Photos by E. R. Martin, Alaskan Boundary Survey

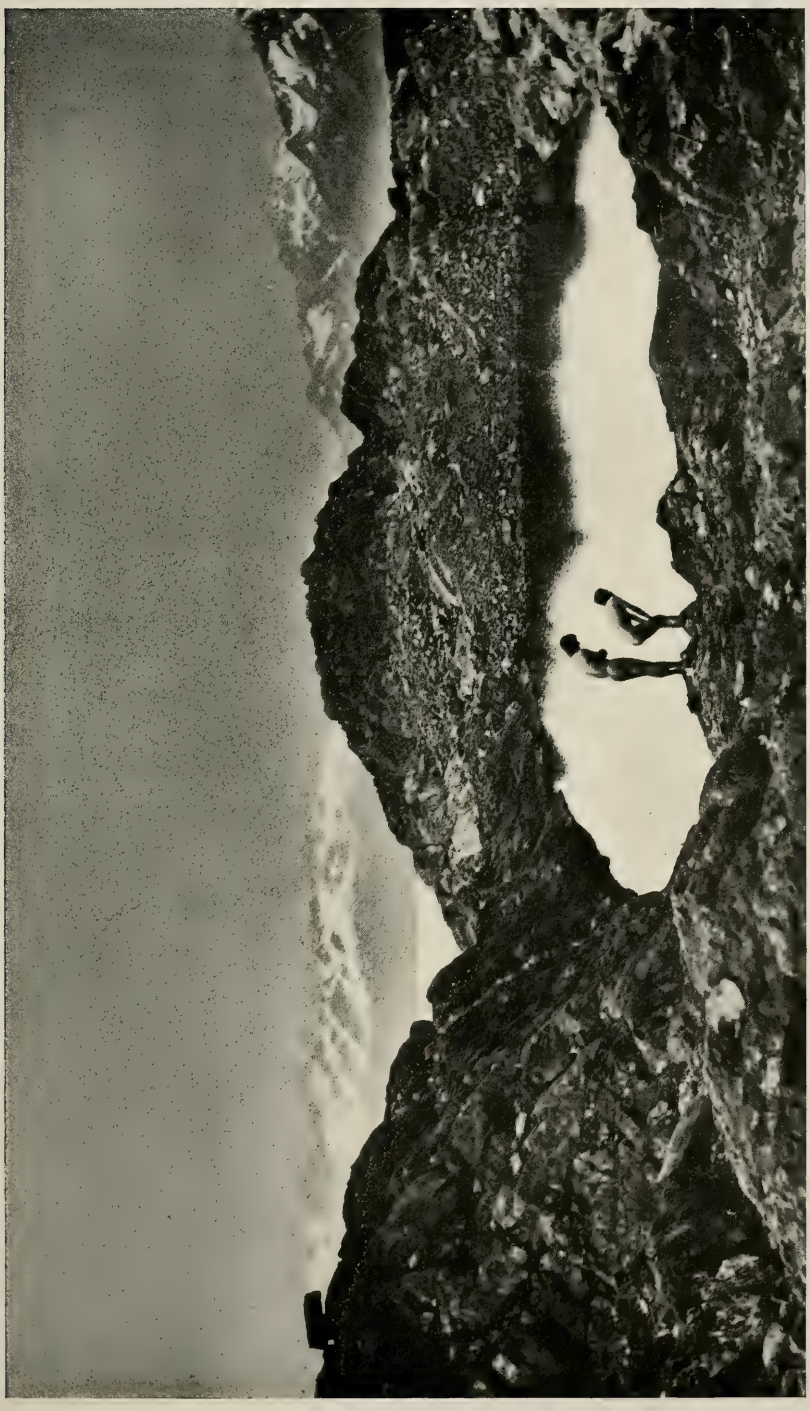


Photo by E. R. Martin, Alaskan Boundary Survey

TAKING A SWIM IN A POOL ON THE MOUNTAIN TOP

A DROWNED EMPIRE

By Robert H. Chapman

THE swamp issue has recently appeared upon the legislative horizon as a new and rather attractive proposition. Until very recently, federal reclamation of American morasses had not been considered seriously. The National Geographic Magazine last year published a general résumé of the drainage question by Mr H. M. Wilson;* but since then the subject has taken shape with great rapidity, until now it looks as though we might have within the very near future a second reclamation act, this time for the purpose of removing the excess water from, rather than supplying it to, agricultural lands.

In response to a Senate resolution, Secretary Garfield has recently transmitted to Congress an instructive report† on the work which the bureaus of his department have already done in connection with swamp and drainage matters. While the country generally has supposed that drainage, so far as it is related to the work of the federal government, is a new question, and that any information that Congress might want with respect to swamp lands would be forthcoming only after much investigation, it seems these bureaus have not only been for years making detailed surveys and studies of swamp lands of the United States, but the Department of the Interior has in several cases entered into actual drainage construction of large tracts in connection with irrigation projects.

Over twenty years ago the Geological Survey started a special investigation of the swamp areas of the country in the work of the late Professor Nathaniel S. Shaler, and his estimate of approximately 78,000,000 acres of wet lands east of the 100th meridian stands today as accurate, probably, as any figures yet produced. The fact, as stated in Mr Garfield's report, that between seven and eight million acres of swamps have been incidentally surveyed by the Geological Survey in connection with the general topographic survey of the United States directs attention to the great value of this class of work. One-third of the area of the country has already been covered topographically, and in this area where swamps occur these maps, taken in connection with the hydrographic and geologic investigations of the Survey, afford all the preliminary information required for determining the feasibility of drainage projects and for planning the broad features of construction.

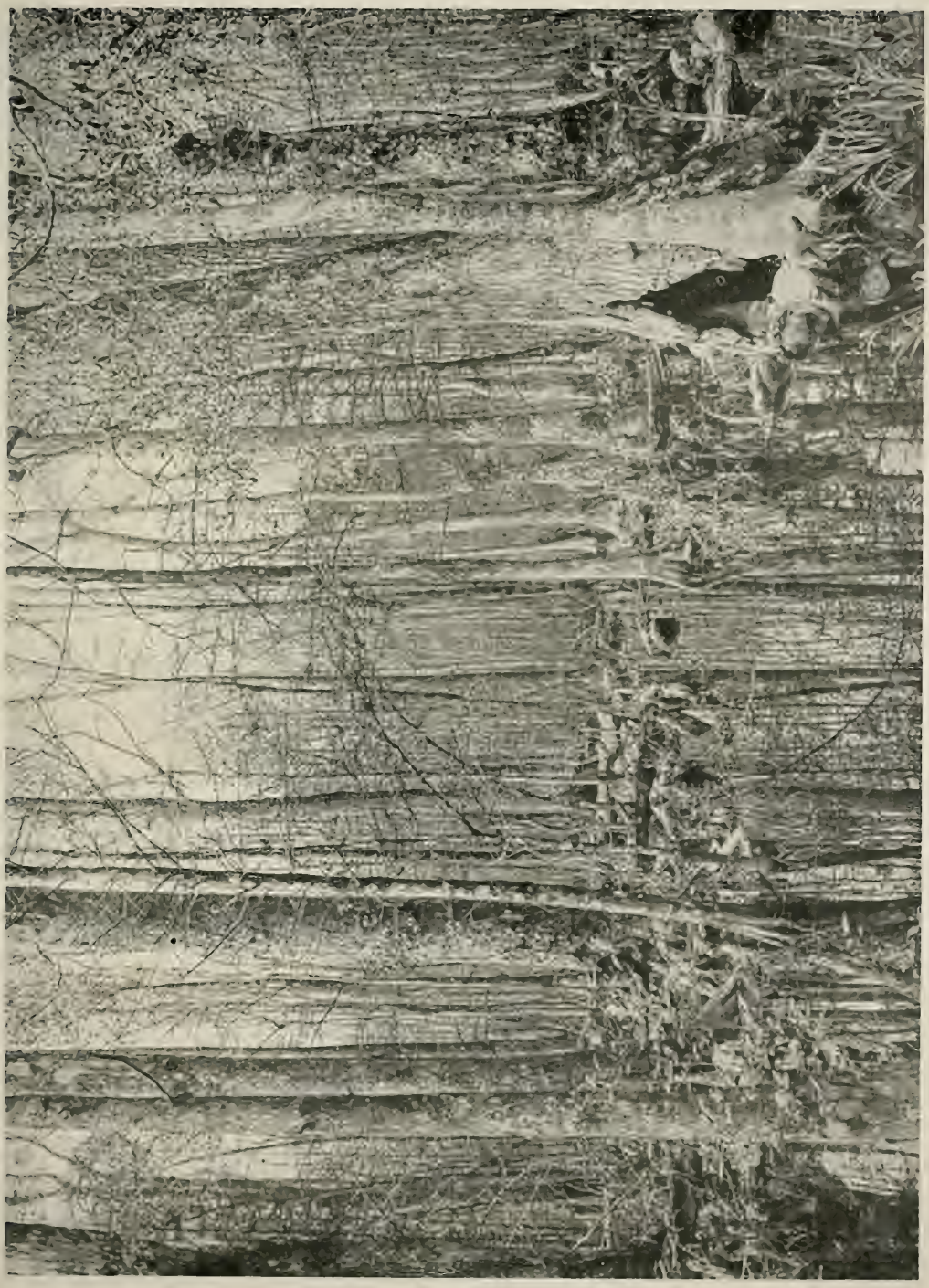
The reason that greater swamp areas have not been mapped is indicated by the fact that since the primary purpose of the topographic work of the Survey is to secure a base for the geologic map of the United States, the specific localities chosen for topographic surveys have naturally been those of greatest geological and mineral importance and have not included any great swampy regions.

Several special drainage surveys, however, are described, as, for instance, the work in the Sacramento Valley of California, where a coöperative survey is being conducted by the state and the government, the Geological Survey doing the work. In this case special maps, designed for reclamation purposes, are being made of the million acres of rich tule swamps, about two-thirds of the work having been completed. In this valley is located the greatest combined drainage and irrigation project in the United States, comprising a million acres of swamp and two million acres of reclaimable arid lands.

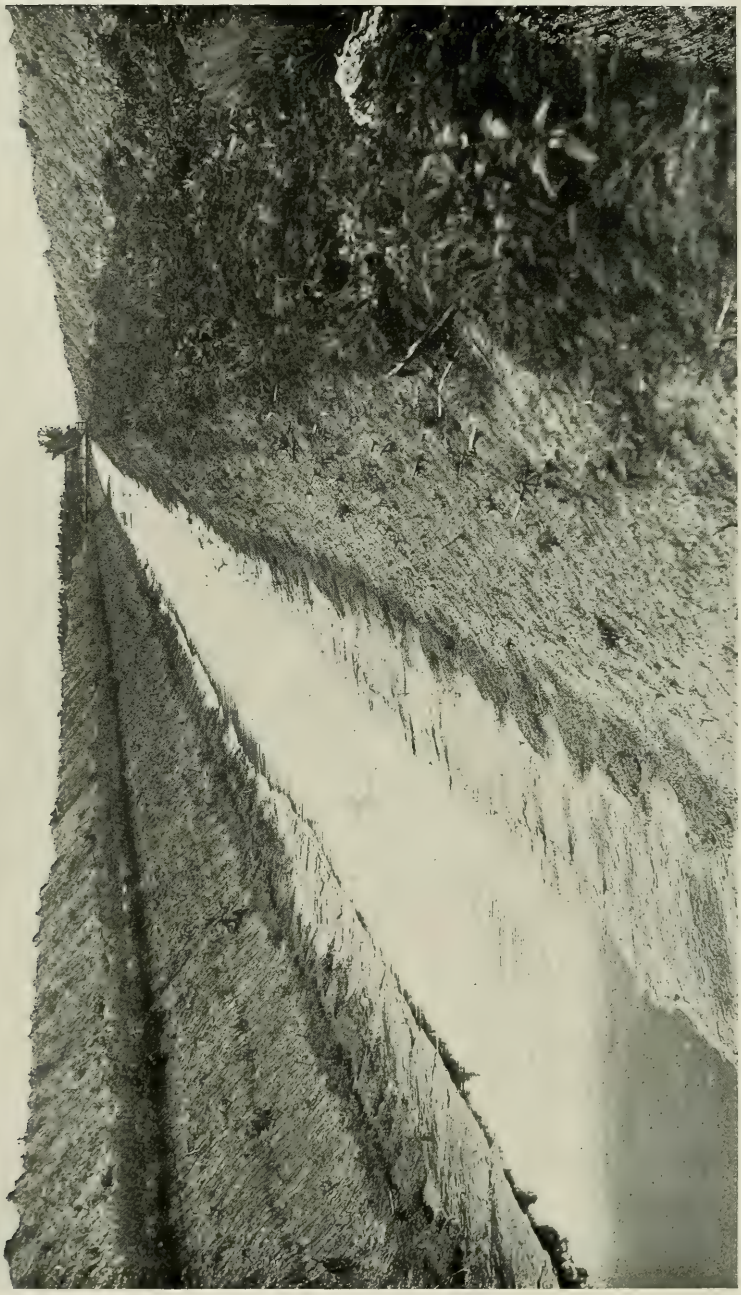
A special drainage survey is also being made in the upper Yazoo delta, Mississippi, under coöperative arrangement between the Geological Survey and the

* National Geographic Magazine for May, 1907.

† Senate Document No. 151.



SCENE IN DISMAL SWAMP—SOUTHERN MARGIN, NEAR ELIZABETH CITY, N. C.



A WELL CONSTRUCTED DRAINAGE DITCH—SIDE SLOPE PREVENTS CAVING AND EROSION

A POORLY CONSTRUCTED DRAINAGE DITCH—SIDES CAVED AND ERODED

ROAD-MAKING ACROSS NEWLY RECLAIMED TRACT OF SWAMP LAND IN SACRAMENTO VALLEY

State of Mississippi. It is probable that construction work in this area will be undertaken by the formation of a drainage district, the fund necessary for this purpose to be raised by assessment of the land improved.

IMPORTANT PROJECT IN MINNESOTA

In northern Minnesota a very interesting problem is presented. Here the United States owns about 2,500,000 acres of land which the Chippewa Indians have ceded to the government, to be held in trust and disposed of for their own benefit. Without some improvement of the lands, however, there is little likelihood of the Indians realizing much of anything from them, since they constitute a vast swamp, with only here and there small patches of arable land. The settlers on these isolated tracts are as completely marooned during long periods as though located upon islets in the ocean. So Congress has authorized the survey of these lands with a view to determining the feasibility of their reclamation by drainage, and the Geological Survey has completed the major portion of the work and has even drawn detailed plans for the reclamation, by draining, of one portion of the swamp, known as the Mud Lake district. An amendment to the Indian appropriation bill has been proposed by Representative Steenerson of Minnesota allotting $1,000,000 for the drainage of this district, to be expended under the direction of the Secretary of the Interior.

Mr Garfield also directs attention to the very considerable drainage work that is being done by the Reclamation Service in connection with its irrigation problems in the West. In one instance, in the Klamath, Oregon-California, project, some 50,000 acres of swamp land will be reclaimed by drainage, and under an extension of this great project there will be at

TYPE OF CONVEYOR DREDGE USED IN CHANNEL-DEEPENING

least an additional 100,000 acres drained. The Secretary points out with commendable pride that in the event that Congress should require additional surveys or drainage construction work performed, his department has already two fully equipped bureaus, the Geological Survey and the Reclamation Service, ready at any day to extend the drainage work they are in reality already doing, and at the same time he calls attention to the fact that, considered in its entirety, the drainage problem is not as simple a one as many suppose. It involves the handling of one of the most powerful forces with which man has to cope and is a matter of the broadest practical engineering.

The various phases of the problem may be classified as follows:

1. Farm drainage.
2. Drainage and flood control.
3. Drainage, flood control, and navigation.
4. Tidal-flat drainage.

The first is the simplest form of the problem—the draining of a farm or group of farms into the nearest natural run-off channel.

The second and third are closely related and more complex, especially in the determination of engineering measures whereby disastrous floods may be prevented and the water uniformly distributed over low-water seasons, so that navigable stages in the rivers may be maintained.

The fourth comprises such lands as may require protection from both streams and the sea.

The preliminary engineering requirements in every case are in nowise different from those governing the irrigation of arid lands, the construction of inland waterways, the prevention of floods, the conservation of water, or any other important water-supply development. Such problems all involve engineering and physical factors the control of which may extend beyond the area immediately under consideration. There-

RECLAIMED SHIOCTON SWAMP, WISCONSIN—A CROP SAID TO BE 20 TONS PER ACRE

fore any great project of wet land reclamation is far above the plane of mere local ditching. If such work is to be prosecuted intelligently and purposefully, the actual construction must be preceded by topographic surveys, measurement of stream flow, consideration of necessary capacity of channels, and other physical studies. The actual development itself can be carried out only by a corps of competent engineers. In this connection Mr Garfield points out the danger of extensive drainage undertakings without a full consideration of all the factors. Swamps are in a way natural storage reservoirs, and they give off their waters slowly, and if large areas are drained it means that there will result a quicker run-off from the drainage basin, and the question must be considered whether the channel capacity of the natural arteries is sufficient to carry the increased flow, else the improvement of one reach of a basin may result in the overflow and destruction of another reach lower down.

The gauging of the streams in an area considered for draining and the determination of their maximum carrying capacity is therefore an essential part of the preliminary investigation. The value of figures of stream flow are much greater when they have been continued over long periods, and the work and records of the Water Resources Branch of the Geological Survey, which cover many years past, are invaluable.

One of the preëminent factors is the determination of the value of the reclaimed land. The crop it will best raise will give actual figures upon which to base estimates, and the careful attention which the experts of the Department of Agriculture are giving to soil surveys has a most valuable application to the subject.

An item for primary consideration is the maintenance and extension of the navigable waterways, which are directly under the control of the engineers of the U. S. Army.

The amount of work to be done is

DIFFICULTIES ENCOUNTERED IN SURVEY OF SACRAMENTO VALLEY (U. S. GEOLOGICAL SURVEY PARTY)

sufficient to keep the several branches of the government each hard at work on the particular problem it is best fitted to do, and calls for the most earnest and hearty coöperation of all.

PUBLIC DEMAND FOR NATIONAL DRAINAGE

The apparent popularity of the national drainage issue is evidenced by the large number of bills that have been introduced in Congress at this session, while very substantial progress has been made in the way of proposed legislation. The Senate Committee on Public Lands has considered and digested the various bills and has unanimously reported to the Senate, with favorable recommendations, a comprehensive measure. It is predicted by the author of the bill, Senator Flint, of California, that it will undoubtedly pass the Senate in the near future. What its fate will be in the House remains to be seen. It is believed that the majority of the members of that busy body favor national drainage enactment, but it is a question whether the bill will be allowed to come to a vote.

The provisions of the bill are in the main as follows:

The proceeds from the sale of public lands in the non-arid public-land states (those not contributing to the national irrigation fund) are appropriated as a "drainage" fund, dating back to June 30, 1901, in order to give drainage an even start with irrigation. The work of drainage reclamation is to be carried out by the Secretary of the Interior, who is given wide discretion in the premises; among other features, he is empowered to

MINNESOTA SWAMP SURVEY (U. S. GEOLOGICAL SURVEY PARTY EN ROUTE)

HAND-DITCHING BY CONTRACT LABOR, HOLBECK'S SWAMP, NEAR CHARLESTON, S. C.

subdivide the reclaimed tracts into farm units of from 5 to 160 acres. It is now recognized that the minimum unit of 40 acres, under the irrigation act, is, under certain conditions of great fertility and productivity of soil, far in excess of what constitutes an adequate area for a farm home, where a man may make a comfortable living for himself and family. The cost of the drainage construction is to be charged against the land reclaimed, as under the irrigation act, and is to be repaid into the drainage fund in not to exceed ten annual installments. To secure this repayment the government is to have a first and paramount lien on the land. Where other than public lands are reclaimed the loan of the money from the drainage fund is to be upon the bonds of the state, the municipality, or drainage district and secured by lien on the lands. There is to be no commutation of homesteads in case of the reclamation of public lands.

The bill is thus seen to closely follow the general principles underlying the irrigation act—the money is obtained from the sale of government lands, so that the appropriation is automatic; the fund, through the return to it of the cost of construction by the land-owners, becomes a revolving one, and most of the details of execution are left to the Secretary of the Interior.

TOPOGRAPHER AT WORK IN TULE SWAMP OF SACRAMENTO VALLEY, CALIFORNIA

Under this measure national drainage would begin existence with not less than six million dollars, the receipts from the sales of lands in the states included under it having been from 1901 to June 30 1907, $5,813,258. Since the Secretary of the Interior is not restricted in making requirements for the repayment of the cost of construction, it is probable that in such cheap reclamation work as is estimated for in the Mud Lake district, where the cost will be less than $3 per acre, he will provide for the repayment to the fund in a shorter period than the maximum 10 years. In this event the money would be available for a second use in possibly five years from the completion of the project and settlement of the land.

To save a person from drowning calls for more or less heroism in every case. To win from the realm of the powerful Water King a flooded and perishing empire as large as that of Great Britain and Ireland, and so furnish homes for men, women, and children, requires careful study, intelligent direction, and unceasing labor.

HAITI: A DEGENERATING ISLAND*

The Story of its Past Grandeur and Present Decay

By Rear Admiral Colby M. Chester, U. S. Navy

GEOGRAPHICALLY, the Island of Haiti, including within its limits the two republics of Santo Domingo and Haiti, is in the class of the most favored of nations. Situated on the Western Continent about midway between its two grand divisions of North and South America and abounding in natural resources, it might be an emporium for each, if its inhabitants were of as high an order as the country itself.

The general sailing directions for ships bound from New York to almost any part of the Greater Antilles, or to the north coast of South America, require a course to be steered due south on the seventy-fourth meridian of longitude, which passes Watlings Island, the San Salvador of Columbus, close aboard, and leads into the Caribbean Sea between the islands of Cuba and Haiti; thence a slight change of course to the westward takes the ship to the future entrance of the Pacific Ocean—the Panama Canal. Thus, ships from our own metropolis visiting the neighboring ports, in which we are most interested, will pass close to the "Gem of the Antilles."

The name Haiti, or "High Island," is significant of the character of its topography. "Sire," once said a British admiral to his king, George the Third, when asked about the island, "Haiti looks like that," and he crumpled up a piece of paper and placed it upon the table. A brief description though this may be, it well fitted the case. The island is about 400 miles long, 150 miles wide, and is about the size of the State of New York. It is irregular in shape and is intersected by three chains of mountains.

Haiti has a climate peculiar to itself. While it is dominated by the usual hot and dry seasons of the tropics, some of its high peaks, which extend nearly up into the snow limits of the atmosphere, seem to draw from the trade winds which sweep across their summits the moisture, which is precipitated almost daily for a short time, and thus the dry season is robbed of its drought-affecting proclivities.

THE ORIGINAL SEAT OF PARADISE

Only one opinion seems to exist in the minds of historians concerning the general salubrity of the climate, the productiveness of the soil, and the beauty of the scenery of this remarkable island. "In the delightful vales," says Raynal, "all the sweets of spring are enjoyed without winter or summer. There are but two seasons of the year and they are equally fine. The ground, always laden with fruit and covered with flowers, realizes the delights and riches of poetical description. Wherever we turn our eyes we are enchanted with a variety of objects colored and reflected by the clearest light. The air is temperate in the daytime and the nights are constantly cool." Naturally this account refers particularly to places on the island where foreigners are wont to congregate, but it also accords well with my own experience there.

The memory of a night spent in the hills above Port-au-Prince, where this description strictly applies, is frequently in my mind. Here, after a night of rest, the new day began with a swim in a beautiful pool of mountain water which ran through the lower part of our host's house; and this, accompanied by gentle breezes wafting sweet odors and mingling with the song of birds,

*An address to the National Geographic Society.

made the place enchanting. As I gazed upon the beauty of the picture presented to me, I could well understand Columbus' enthusiasm and boast that he had discovered the original seat of Paradise.

Historically, Haiti, or Santo Domingo, is the senior of our own country, if we leave out of consideration the legendary reports concerning the visits of the Norsemen to our northern coasts 800 years ago, and we are somewhat indebted to this beautiful island for our own development.

It appears providential that Columbus should have been led to this Eldorado of his day to make his first settlement, when so many other localities seemed to be the pole to which his compass pointed, for here he met a less warlike people than he would have found in the north, and the latter might have blotted out of existence the spark of exploration which was started by this first expedition to the New World. We know that the dread of cold weather was primarily responsible for his abrupt change of course to the southward, although the glittering prospect of gold which the aborigines led him to believe might exist in the larger islands to the southward had its marked influence on his selection of a route to follow. But Columbus' own brief account of his voyage, as given in his letter to his friend and patron, Luis de Santangel, dated February 15, 1493, explains so well his reasons for his abrupt change of course from the west to the eastward again, and also gives such a fine description of the land he found, that I shall quote a portion of it here:

COLUMBUS' SPANISH LETTER TO LUIS DE SANTANGEL

"SIR: As I know you will have pleasure of the great victory which our Lord hath given me in my voyage, I write you this, by which you shall know that in thirty-three days I passed over to the Indies with the fleet which the most illustrious King and Queen, our Lords, gave me, where I found very many islands peopled with inhabitants without number. And, on them all, I have taken possession for their Highnesses, with proclamation and the royal standard displayed; and I was not gainsaid. On the first which I found I put the name of Saint Salvador, in commemoration of His High Majesty who marvelously hath given all this; the Indians call it Guanahani. The second I named the Island of Santa Maria de Conception, the third Ferrandina, the fourth Isabela, the fifth Isla Juana; and so for each one a new name. When I reached Juana (Cuba) I followed its coast westwardly and found it so large that I thought it might be the mainland province of Cathay. . . . At the end of many leagues, seeing that there was no change, and that the coast was bearing me northwards, whereunto my desire was contrary, since the winter was also confronting us, I formed the purpose of making from thence to the south, and as the wind was also against me, I determined not to wait for other weather and turned back as far as a port agreed upon (probably Gibara). . . .

"I understood sufficiently from other Indians whom I had already taken that this land, in its continuousness was an island; . . . from its headland I saw another island to the east eighteen leagues distant from this, to which I at once gave the name La Española. And I proceeded thither and followed the north coast, as with La Juana, eastwardly for a hundred and seventy-eight great leagues in a direct easterly course, as with La Juana. The which, and all the others, are most strong to an excessive degree and this extremely so."

HAITI AS COLUMBUS SAW IT

The route as described by Columbus seems then to have led him away from the western course, and he thus stumbles almost on the finest island of the group into which he had entered. His letter, continuing, tells of his first impression of the beautiful island; and as he found it,

so may we see it today, if we shut out the black picture which is the product of his countrymen's avarice.

"In it" (Haiti), he says, "there are many havens on the seacoast, incomparable with any others I know in Christendom, and plenty of rivers so good and great that it is a marvel. The lands there are high, and in it are very many ranges of hills and most lofty mountains incomparably beyond the Island of Centrefrei (or Teneriffe); all most beautiful in a thousand shapes and all accessible, and full of trees of a thousand kinds, so lofty that they seem to reach the sky. And I am assured that they never lose their foliage, as may be imagined, since I saw them as green and as beautiful as they are in Spain in May and some of them were in flower, some in fruit, some in another stage, according to their kind. And the nightingale was singing, and other birds of a thousand sorts, in the month of November, round about the way I was going. There are palm trees of six or eight species, wondrous to see for their beautiful variety; but so are the other trees and fruits and plants therein. There are wonderful pine groves and very large plains of verdure, and there is honey and many kinds of birds, and many mines in the earth; and there is a population of incalculable number. Española is a marvel; the mountains and hills, and plains, and fields, and the soil, so beautiful and rich for planting and sowing, for breeding cattle of all sorts, for building of towns and villages. There could be no believing, without seeing, such harbors as are here, as well as the many and great rivers and excellent waters, most of which contain gold. In the trees and fruits and plants, there are greater diversities from those of Juana (Cuba). In this there are many spiceries and great mines of gold and other metals. The people of this island and all others that I have seen, or not seen, all go naked, men and women, just as their mothers bring them forth." . . .

THE LAUGHING NATIVES LONG SINCE EXTERMINATED

The tribute which Columbus pays to the natives in continuing his narrative would satisfy even Bellamy's ideals as expressed in his "Looking Backward." I should like to quote all of his letter for the benefit of those who have not been so fortunate as to read it, but space does not permit. A paragraph or two will give the gist of his ideas.

"It seems to me," he says, "that in all those islands the men are content with a single wife. . . . Nor have I been able to learn whether they hold personal property, for it seemed to me that whatever one had, they all took share of, especially of eatable things. . . . I have not found any monstrous men, but, on the contrary, all the people are very comely; nor are they black like those in Guinea, but have flowing hair; and they are not begotten where there is an excessive violence of the sun. Of anything they have, if it be asked, they never say no, but do rather invite the person to accept it, and show as much lovingness as though they would give their hearts. And they know no sect or idolatry, save that they all believe that power and goodness are in the sky, and they believe very firmly that these ships and crews come from the sky; and this comes not because they are ignorant; on the contrary, they are men of very subtle wit, who navigate all these seas and who give a marvelously good account of everything."

We do not wonder when reading his full description that he called this spot the Garden of Eden. Would that we could look on the inhabitants of this beautiful island now as Columbus depicted it; but, alas! since his time a sad change has gradually crept over the island, so that now foreigners shun it as they do a pestilence.

In reading the history of its people since the extinction of the aborigines our hearts sicken and we are appalled by the revelations there disclosed.

Its pages are black with the marks of

blood shed and crime committed, not alone by the ignorant and superstitious, but more especially by those of intelligence and education, and even our own race is not altogether blameless or wanting in responsibility for this condition of things.

On Saint Nicholas Day (December 6), 1492, Columbus entered a port at the extreme west end of the Island of Santo Domingo or, as the whole island was then called by the aborigines, Haiti. The natives themselves called the port Bohio, but Columbus christened it, in honor of the day he was celebrating, Port Saint Nicholas, the name still existing as Saint Nicholas Mole. This date will ever be memorable in the annals of the Haitiens as marking the beginning of the history of the island.

Columbus now called the island Hispaniola in honor of the country which had sent him forth to discover it, and it is to be regretted that this name given by the immortal discoverer has been lost, for its present two names are conflicting and confusing.

The small squadron which formed Columbus' expedition to the New World had come the whole distance across the ocean intact, but off the coast of Cuba the captain of the ship *Pinta* deserted with his ship and left him only the flag-ship *Santa Maria* and the small *Nina* to continue the voyage. Speeding on as rapidly as the difficult navigation would permit, the two ships came to anchor off a small village now known as Port de Paix, which was so beautiful a spot that he called it the Vale of Paradise. Here Columbus opened communication with the Indian King or Cacique Guacanagari, who ruled one of the five principal divisions of the island and who sent him presents of gold and assured him that more could be found farther to the eastward. Columbus had no doubt at this time that he had reached the Asiatic continent, and he was anxious to return and report his good fortune to his king and queen. But unfortunately soon after leaving Port de Paix his flag-ship, the *Santa Maria*, drifted upon a shoal and became a total wreck.

THE FIRST SETTLEMENT IN THE NEW WORLD

As the better part of his force was embarked on board this ship, his position was most precarious, and he was forced to at once build a fort on shore and leave in it a large portion of his men for a garrison.

The wreck occurred near the present port of Cape Haitien, on Christmas eve, 1492. The hospitable natives lent willing hands, and Columbus soon had the fort constructed from the salvage of his ship near a village then called Guarico. This he named the Fortress of Navidad; and this was the first structure built in America. Soon after the fort was completed he left it with a garrison of 30 men and, proceeding to the eastward, he was fortunate to again fall in with the *Pinta*, which vessel had deserted him in Cuba, and in company with that ship he returned to Spain to make his report.

His grateful sovereigns soon fitted him out again with a force of 17 ships and several hundred men to carry on his explorations from Fort Navidad, and among those who enlisted for the voyage were a large number of his wealthy countrymen, who cast in their lot and their fortunes with him in order to gain a share of the golden prize which the Admiral assured them was within their grasp. But, as is usual where avarice is the ruling spirit, troubles grew faster than riches. His first great misfortune after his return was to find that all of the garrison he had left at Navidad had been slain by the natives of the interior, notwithstanding his good friend Guacanagari had defended them with such gallantry as to produce the almost entire destruction of his own people.

Columbus then determined to build a permanent settlement, and after reconnoitering he selected for this purpose a site on an elevated plain near a spacious bay on the north coast of the island. Here was established the first town in

the New World, which was dignified by the name of his queen and patron, Isabella.

The position of the town had the only advantage of being contiguous to the gold country, which was the real objective of the party; consequently the center of activities was soon transferred to other parts of the island, and Isabella became only a name with a few ruins to show from whence the first expedition into the interior had started.

Leaving a small force at Isabella, Columbus set out for the gold fields in the interior which he had been led to believe existed there. Passing up the banks of the river Bijo-Bonico, he crossed the mountains through a pass which he called El Puerto de los Hidalgos, or "Gentlemen's Pass," in honor of the gentlemen who composed his party. Here opened out the beautiful Yaqui Valley, through which flows the river to which he gave the name of the Rio del Oro, or River of Gold. The valley he called Vega Real, or Royal Valley, as it was the most beautiful he had ever seen.

The natives, resenting the intrusion of the foreigners, swarmed in great numbers to contest their passage into the gold fields; but the unarmed hosts of the island were no match for the disciplined troops of Spain, and they were overcome and slaughtered in great numbers. A fortress was established on the Janico River, called Saint Tomas, which the natives attempted to take with such disastrous results that they gave up for a time all further resistance to the conquerors. Columbus was now fully satisfied that he had reached the Cipango of the East Indies, for which place he had originally set out.

AN UNHAPPY MARRIAGE

But the course of empire was still south, and soon Santo Domingo City became the center of the colonial activities.

A little love affair connected with the growth of this city is interesting in this connection. One of the Spanish party, Miguel Dias, having gotten into difficulty with an officer, severely wounding him in combat, fled to escape punishment. Finding shelter in an Indian village and being received with much cordiality and hospitality, he in return gave his heart to the young Caguisas, who was then governing the tribe. His protestations met with favor, and the young Spaniard soon found himself the consort of a queen of no mean accomplishments. But he soon wearied of his environment and sighed for his old companions. The queen, seeing his discontent and fearing to lose him, gave him the secret of her vast wealth and, loading him with the precious metal, sent him back to the Spaniards to induce them to return with him and settle in her country. Dias delivered this message to Columbus, who immediately ordered an exploration of that part of the island to ascertain the truth of the Spaniard's report.

The sequel to this little love affair is also interesting, but most pathetic. Zamcaca, after giving her all to her lover, who was thereby promoted to high honors in the colony, being the first alcalde of the new city, was so disheartened by the cruel treatment accorded her people that she fled from civilization and affluence to the wilds of the forests, leaving her two children and still faithful husband to mourn her loss, and was never heard from again.

From this origin, so casual and domestic, arose the first permanent city of the New World.

Thus the Spaniards were drawn to the south of the island, where they built a fort called New Isabella, and Columbus, who was about to return to Spain, was so impressed by the glowing accounts of the section given him by his men that he ordered his brother, Don Bartholomew, to select a site and build a town. A place was chosen on the banks of the Ozamas River, and here arose the first permanent city of the New World, which was named Santo Domingo, after Columbus' father.

Soon after the Great Admiral took his departure for Spain, discord became rife among his subjects, and, this eventually

developing into open mutiny, there was inaugurated a rebellion against the powers that be which, repeated from time to time, has made up the principal history of the island to this day.

THE OLD SPLENDOR OF SANTO DOMINGO

In a short time the city of Santo Domingo became one of great importance, and is described as not inferior to any in Spain. When at last Don Diego Columbus, to whom the great discoverer, now dead, bequeathed his rights as well as his perplexities, became the ruler of the province, he set up a court which vied in splendor and magnificence with that of the king himself. Diego's ambition was to build such a capital here as would correspond in greatness to the New World his father had discovered and to the fame and dignity of his family. The court of his young and beautiful queen was thronged by a circle of attendants from her own class in Spain which professed to be the best blood of Castile. Magnificent public buildings were erected, the cathedral was highly endowed and built with artistic taste, while the monasteries were made monuments to the Christian sentiment of the foreigners.

The richness and abundance of gold found in the rivers of the island at first brought great wealth to the Spaniards; but it was soon recognized that cultivation of the soil was of more value than the mines, which could only be profitably worked with the means then extant as long as the gold was found on the surface, and hence agriculture became the principal industry of the islanders. But the gentlemen from Spain were too proud to labor themselves, and being anxious to gain fortunes in a short time, they drove the Indians beyond their strength, and they died in rapidly increasing numbers. Thus was killed the goose which laid the golden egg, for without the laborers the masters became land poor. The old feeling of sedition and discontent still existing in the hearts of the colonists, together with the loss of labor, soon produced a condition of things that was most unpromising for the future welfare of the colony.

King Ferdinand, at first jealous of the Columbian dynasty and the rising importance of Hispaniola, now began to realize but little on his investment, and he soon lost interest in the administration of the colony and devoted his attention to the discoveries in other parts of the New World.

The most redeeming feature in the Spanish control of Hispaniola was the struggle of Las Casas, the celebrated bishop of Chiapa, to save the natives, to whom the island rightfully belonged, from the utter annihilation to which the brutal system of slavery inaugurated by his countrymen was fast driving them. In his vain endeavor to alleviate the sufferings of the aborigines he went even so far as to be credited with introducing into the island the inhabitants of Africa, who had become objects of barter between the Portuguese and other European states, and thus was established the slave trade in America—a curse that was quite as injurious to the well being of the island as the one he endeavored to overcome.

RIVALRY OF ENGLAND AND FRANCE FOR HAITI

The history of Santo Domingo during the 16th century can hardly be given here, even if it were sufficiently important to warrant its repetition. Suffice it to say that the destruction of the aborigines was now complete and the colony rapidly degenerated in wealth, but the power represented in the control of all the colonies belonging to Spain became the envy of her European sisters.

In the early part of the 17th century the English and French combined to secure a portion of the growing wealth of the New World, and this resulted in establishing in 1630, on the neighboring Island of Tortuga, a band of robbers which carried on piratical operations in its worst form. Then, becoming more powerful, they began depredations on Hispaniola, finding that hunting its vast and verdant fields, which abounded in

cattle, to be more remunerative than cutting the throats of their victims on the sea.

The discord that naturally followed this copartnership eventually resulted in the French buccaneers gaining the mastery over their British allies, forcing the latter to take up their abode on the Island of Jamaica, and thus leaving the French in possession of the Island of Tobago, and naturally the northern coast of Santo Domingo also came under French jurisdiction.

AN UNDESIRABLE ELEMENT

From now on the French in the west and Spanish people in the east wrestled in almost continuous strife for the mastery of Santo Domingo, thereby checking for a while the progress of the island and disposing the inhabitants to laziness and vice. It should be noted that, unlike the American continental emigrants, the West Indian voyagers went forth to seek gold only and had no thought of making permanent settlements. They therefore left behind them their sweethearts and wives, to whom they expected to return, and in order to increase the value of the French possessions there were introduced into the island at this time a class of women who were but little better than the buccaneers themselves. The mingling of the blood of this refuse of European civilization gave to their descendants characters as low as can exist in human nature, and to this fact is largely due the present condition of the people here.

In 1776 the line of demarkation between the French and Spanish portions of the island was defined practically as it exists today. After this settlement of the boundary question the different colonies became more friendly and business between them increased, until finally, by the treaty of Bôle, signed July 22, 1795, France came into possession of the whole island; but the formal abandonment of the Spanish government of its control did not take place until January 27, 1801.

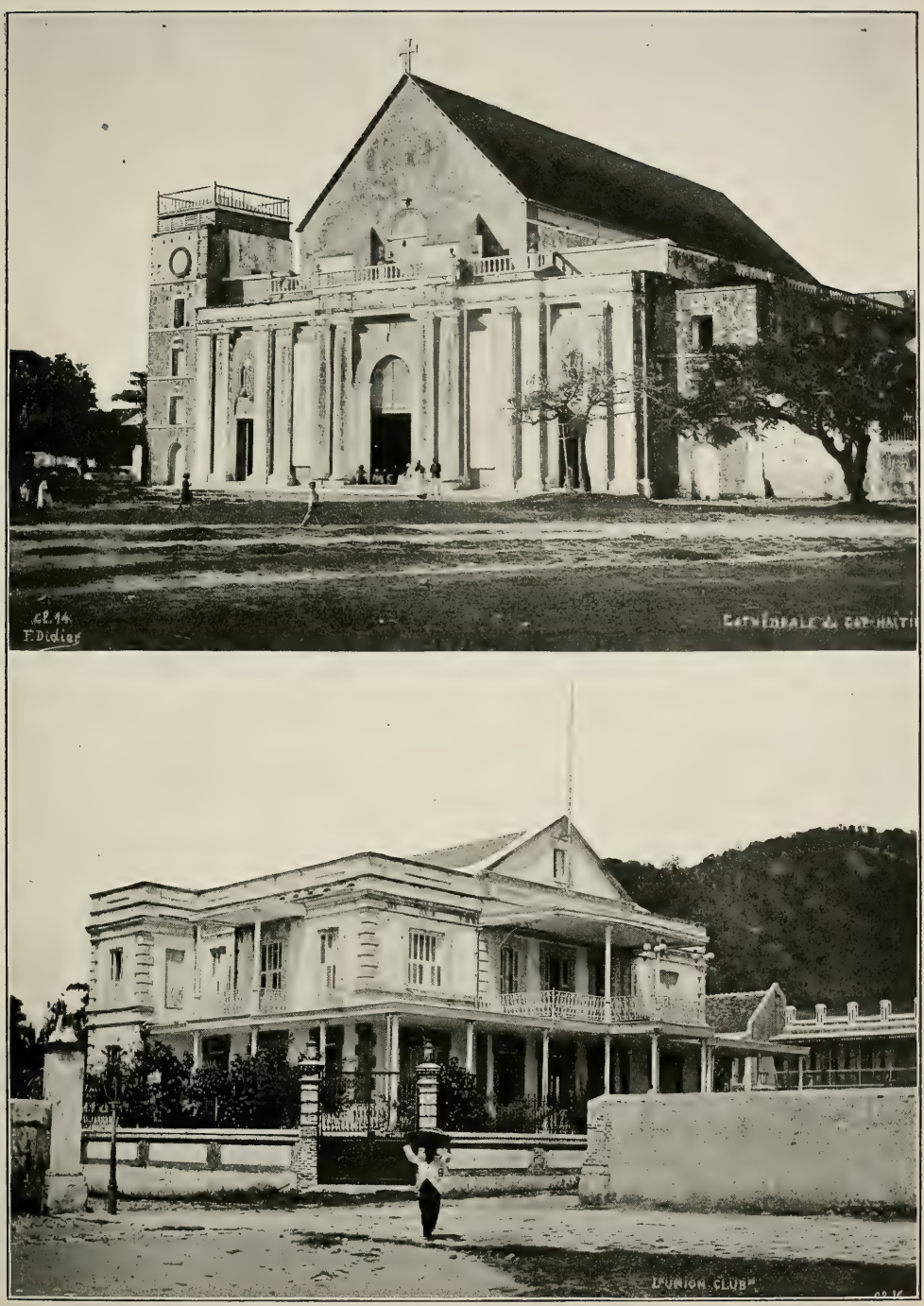
THE DIFFERENCE BETWEEN HAITI AND SANTO DOMINGO

Although the whole island was now under French rule, the two parts, east and west, were irremediably separated by the interests of the different races. In the eastern section the foreigners were in numbers about as one to four of the negroes; in the western section of the island the proportion of the blacks to whites was much larger—at least 15 to 1. This disproportion of numbers in the races accounts for the continued domination of the whites in the east, while the western portion of the island later became the Black Republic.

Following the French supremacy, Haiti proper rapidly rose in the scale of prosperity, becoming the principal colonial gem in the French crown; but its progress was founded upon an insecure base and a fall was inevitable. It is said that fourteen hundred vessels were employed in its trade, which was about two-thirds of the whole external commerce of France.

Among the mulattoes, or free men of color, were many of intellect and refinement, who had been well educated in France, such as Rigaud, Baurais, Petion, Borgella, and Dumas, the father of the celebrated novelist, and although they were few in number, such men aspired to a legal and civil equality with the whites, and in striving for this they naturally felt little sympathy with the slave population and refused to connect themselves with them until too late. To harmonize all the conflicting interests of this mixture of races was beyond the capacity of the colonial government.

When the French Revolution finally broke out in France, throwing the whole of Europe in consternation, it found the French colonists quite ripe for a similar outbreak. About eight hundred of the mulattoes in Haiti had enlisted under the name of the Royal Chasseurs and accompanied Count d'Estaing in his expedition to Savannah during the war of the American Revolution, taking part in our



CATHEDRAL AND UNION CLUB, CAPE HAITIEN

CITIZENS OF CAPE HAITIEN

own struggle for freedom, which strengthened the desire of the Haitiens to secure their own independence. Following the example thus set by both France and America, there broke out that fierce strife known as "The Horrors of the Negro Insurrection in Santo Domingo," which has so darkened the pages of history.

It should not be forgotten, however, that the fearful cruelties practiced during this insurrection were equally shared by both black and white, all parties seeming to vie with each other in the excess of atrocities. Unlike their continental friends, who were generally actuated by a common impulse, the interests of the islanders were hopelessly divided. The population consisted at this time of about 30,000 whites, mostly planters, who had been made wealthy by the labor of the slaves; but they were separated into irreconcilable factions. Second, there were, about the same number of mulattoes, many of them property-owners, whose social, industrial, and legal rights had been restricted to a humiliating degree by the Royalists. Third, there were nearly 500,000 black slaves, who were groaning silently under a cruel form of bondage which they sought to shake off.

TOUSSAINT L'OUVERTURE

Soon after war broke out there appeared upon the scene of activities that wonderful character, Toussaint L'Ouverture, who wrested the command of the army from his superiors, Francois and Baisson, and as a French general finally led the troops to victory.

At first Toussaint was appointed a surgeon to the army, as he had some knowledge of simple medicines, which had given him great influence on his master's estate, and he used this knowledge for the benefit of the insurgent forces to good advantage.

This genius, as he may properly be styled, was a slave, at first known as Toussaint Bieda, from the name of his master's estate, and later as Toussaint L'Ouverture, by which he is known in history, owing to the fact that he had overturned the government.

He was born about 1746, of negro parents, his father being an imported African and, as stated by tradition, the son of a chief. Delicate as a child, the nickname of Fatras-Baton, or "Little Lath," as it has been translated, was given him. Although small and insignificant in person when young, he later became possessed of great strength and endurance. He had received in youth some education from a brother slave, and knew how to read and write and speak the French language as well as the creole patois, and it is said had some knowledge of drawing. He was fifty years old at the time of the insurrection.

This really remarkable man, who, considering his education and environments, has not been inaptly compared to Washington and Napoleon, was now to find himself the master of the island. Beloved to the point of enthusiasm by the negroes, who had raised him to the dignity he enjoyed, he was honored and respected by public representatives of other nations with whom he had dealings.

When there was a lull in the strife which gave him relief from military cares, he devoted his whole time to the arts of peace, and the policy of his whole administration was characterized by the same sagacity and prudence which had distinguished his exploits in the field. He restored the planters to their estates and pushed forward the cultivation of the soil, realizing, as does Booker Washington, the negro chieftan in the United States, that the salvation of his people was occupation for mind and body, and that the land was given them as a talent from which they must earn a living.

As the ancient colonial government was now at an end and all official intercourse with France cut off, Toussaint promulgated a new constitution, which recognized the equality of the races and as much freedom of trade as possible. A governor was to be named for five years, but on account of the eminent services of Toussaint, he was to occupy the post for

life, with the power to name a successor. This proclamation was made in due form in 1801.

He decreed that slavery should be forever abolished, and at the same time the planters were by law required to give a fifth part of the crops in payment for the labor of the freed slaves, and at the same time the negroes were compelled to labor for their sustenance. To carry this scheme into practical operation was a no less difficult task for him than for the negroes, but the ex-slaves were, with few exceptions, contented and happy.

Though the Spanish colony had been formally ceded to France in 1795, and different posts had in consequence been actually occupied by the Republican troops, yet the city of Santo Domingo, the capital of the eastern part of the island, still remained in the hands of the Spaniards. To obtain possession of the capital and to establish such regulations as might be required on its change of government, Toussaint made a trip through the whole island for this purpose, which was in reality a triumphal march after his great victories in the field. The end of the year 1801 found every part of Santo Domingo in quiet submission to the negro chief and rapidly improving in wealth and happiness under his wise administration. With the aid of the whites, whom Toussaint was anxious to befriend, agriculture was beginning to improve; the finances were getting in order, and the government was being wisely and regularly administered. This prosperity, however, was soon to be interrupted by calamities as serious as any which had ever visited the ill-fated island.

CAPTURE OF TOUSSAINT L'OUVERTURE BY TREACHERY

War having ceased between Great Britain and France in October, 1801, the French navy, which had not for several years been able to leave its ports without fear of capture, was once more free, and Bonaparte determined to recapture Santo Domingo. Although Toussaint had in no way separated the colony from the mother country, Napoleon became suspicious of the black general's ambition and, fearing lest his principal colony should slip away from him, he was induced to listen to the strong appeals of the planters whose estates had been ruined by the negro insurrection, who insisted that they could not be restored unless slavery was again resumed. To counteract the growing tendency of the islanders to free themselves from his control, as well as to offset any possibilities of his everlasting enemy, England, reaping benefit from an alliance with the new country if left to act for itself, Napoleon planned and fitted out the famous expedition of 1802 to bring the colony again under subjection. His brother-in-law, General Leclerc, was given an imposing force of 30,000 men, reinforced, it is said, from time to time up to 55,000. The general embarked and with his naval convoy proceeded to Cape Haitien, where he arrived on the 12th of February of that year. There can be no doubt that the avowed object of the expedition was to restore slavery, although this object was disguised by kindly and friendly letters to Toussaint, such as Napoleon knew so well how to write.

It is not intended to go into the history of this fatal attempt on the part of the French government to reënslave its subjects—a history that is characterized by unspeakable atrocities on the part of the French, who set an example that was speedily followed in retaliation by the negroes. Toussaint, assisted by his two principal chiefs, Christophe and Dessalines, fought with the bravery of desperation; but they were at last overcome, not by battle, but by the artful persuasion and duplicity of his enemy in debauching his own people, who were tired of the struggle. Finally a truce was declared and the tricolor again waved over the whole land.

RETRIBUTION BY THE BLACKS

Probably one of the blackest pages in Napoleon's record is his treachery to Toussaint in cajoling him into disarmament and then having him kidnapped

and carried back to France to die in a dungeon. But retribution speedily followed this perfidity, for the negroes, seeing their beloved chief so basely and cruelly treated, again hoisted the flag of rebellion and, under the leadership of Dessalines and Christophe, assisted by the pestilential yellow fever, they drove the intruders out of the island and into the hands of their implacable enemy, the British, who had again declared war against France. It is said that this expedition to reënslave the blacks cost Napoleon $40,000,000, besides almost all of his troops.

On the first of January, 1804, Dessalines, who followed Toussaint as general-in-chief of the army, promulgated the declaration of Haitien independence, and the country has remained the Black Republic ever since. The name of Haiti, as the island was designated by the aboriginal inhabitants, was now revived and has never been changed. Dessalines, who was soon afterward proclaimed emperor, started a bloodthirsty policy of exterminating the French subjects who still remained in the country, and his acts of cruelty showed how well he had been schooled under the French; but in spite of this many of the planters, who had the alternative of falling into the hands of the English or run the risk of being murdered by the negroes, remained on the island, and as Dessalines' object became later to restore his exhausted male populace, they were gradually allowed to resume tilling the soil.

Dessalines' administration was, fortunately for the Republic, short-lived, but his cruel nature and implacable hatred of the whites led him into such acts of bloodshed as to shame even his own race. At the time of the insurrection in 1791 he was a slave to a negro whose name was Dessalines, and this surname was added to his own, Jean Jacques. He was short in stature and strongly built, of great activity and undaunted courage. He undoubtedly had great military talents in spite of his want of education, but the respect he commanded was due rather more to the terror he inspired than to his ability as a general. He was at last conspired against by his own army, arrested, and killed in an attempt to escape, October 17, 1806

During the insurrection the Revolutionists, who were mainly composed of the negroes, had their headquarters in the north, generally at Cape Francois. While the colored people, many of whom were small property-owners, had established a colony by themselves in the southern part of the island, and having but little in common with the slaves, there was a gradual separation of the two classes, the blacks predominating in the north and the colored people in the south.

Upon Dessalines' death, Christophe, one of Toussaint's generals, took his place, and several years later declared himself king under the title of Henry I, King of Haiti.

Christophe and his wife were crowned as king and queen at Cape Francois, to which place was given the name of Cape Henry. The royal court, copied after the monarchies of Europe, was established here, and a full line of titles was given out, many of them, such as the Count de Lemonade and the Duke de Marmalade, still existing on the island. Christophe, during all his reign of 12 years, put forth his utmost energies to develop the natural prosperity of the island. He introduced the Protestant religion and the English language into the schools, but at the same time he never ceased to prepare to defend his country against the French, which he rightly feared would again attempt to reënslave it.

On a lofty mountain top above the beautiful valley of Millot, back of Cape Haitien, he built that remarkable structure known as Sans Souci. He lived in this palace with his suite in a state of regal splendor. The ruins of the palace, now overgrown by tropical plants, are a monument to Christophe's engineering skill; but more wonderful still is the stupendous castle fortress, built as a refuge in case the French should again appear. Within the walls of this fortress, which

are one hundred feet high and twenty feet thick, many of the three hundred guns which were mounted on its parapets remain to show the skill and endurance which enabled them to be brought up the steep mountain sides.

THE EASTERN END OF THE ISLAND ASKED FOR ANNEXATION TO UNITED STATES

In 1844 the people of the eastern end of the island again separated themselves from Haiti and established the Republic of Santo Domingo, or the Dominican Republic, as it is officially designated, and from that date to the present time the two divisions have been maintained.

Under the directions of a resolution passed in the United States Congress January 12, 1871, a commission was dispatched by President Grant to investigate the conditions in Santo Domingo. This country has always, more or less, been a source of solicitude to us lest some European power should again attempt aggressions against the Monroe Doctrine. The commission was the result of an almost unanimous vote by the inhabitants of the Republic in favor of annexation of their country to the United States. The report of the commission was favorable to its annexation, and being approved by President Grant, it was submitted to the Senate, which, however, took no action upon it. On January 10, 1873, the Bay and Peninsula of Samana were ceded to a company formed in the United States, and through the means this company afforded us it was thought a coaling station might be established here for the use of the navy, but it is probably fortunate for us, at least, that this was not done, and as the contract with the company was withdrawn in March, 1874, the matter was eliminated from our diplomacy.

As will always be the case, the officers of the United States Navy have been interested spectators in the progress of this island. The navy is now engaged in an extensive hydrographic survey along its coasts, which is much needed, not only for ourselves, but for the commerce of the world in general.

Many naval officers who have been sent to guard American interests on the island have frequently been called upon to handle matters of international policy, and the responsibility resting upon them at such times is rarely conveyed by the brief accounts given of such transactions in the daily press. Almost always during the many local disturbances which occur here an American war vessel is present, and sometimes her captain is called upon to settle, upon the spur of the moment, questions that might affect the very peace of the nation, and the officer must stand or fall as his course meets with approval or disapproval by his superiors. A long list of such cases might be made, but I will briefly refer to only one.

PRESENT CONDITIONS IN SANTO DOMINGO

As stated by the President in his annual message to Congress for the year 1905, "The conditions in Santo Domingo have, for a number of years, grown from bad to worse, until a year ago all society was on the verge of dissolution. Fortunately just at this time a ruler sprang up in Santo Domingo who, with his colleagues, saw the dangers threatening the country and appealed to the friendship of the great and powerful neighbor who possessed the power and, as they hoped, also the will to help them. Accordingly the executive department of our government negotiated a treaty under which we are to try to help the Dominican people to straighten out their finances."

For this purpose Commander A. C. Dillingham, owing to his exceptional knowledge of the conditions in the Dominican Republic, due to an extended tour of duty in that country, was appointed by the President a special commissioner and sent to the capital city January 5, 1905, to prepare, in connection with the minister resident Mr T. C. Damson, a memorandum of the treaty.

The treaty is still held in abeyance by the Senate, but the principal features are being carried out by American citizens appointed by the Dominican Government with *greater marked success*

BOYS OF SANTO DOMINGO

than was really hoped for. The collection of *practically* the *only* revenue of the Republic which comes from a tax on its exports and imports is thus separated from political manipulation and peculation and the receipts are divided into two parts, 45 per cent of which is allotted for the expenses of the government, while the remainder goes into a sinking fund to cancel the obligations for all claimants who hold its certificates of indebtedness. The result thus far is to give into the public treasury from the smaller portion of its income a greater amount of money than has ever been received heretofore from the whole revenue of the Republic. We may well consider if this part of our duty as an elder brother, which we owe to our small sister republics on the American continent, is not of more benefit to ourselves, to say nothing of our moral obligations, than would be a resort to physical force, which we might be led to use in order to protect the principles of the Monroe Doctrine, which is the basis of our political power.

THE REMAINS OF COLUMBUS SAID TO BE AT SANTO DOMINGO

One achievement of which the Dominican people are very proud is that of still retaining within their borders all that remains of the illustrious discoverer of America.

These remains were sent from Valladolid, Spain, after the death of Columbus, to the land he discovered, and deposited in the cathedral at Santo Domingo City. When the island passed under French control, in 1795, a frigate was sent from Havana to remove to that city the body of the great Captain. The officials, finding a vault under the pavement of the Cathedral, thought a person of no less rank than Columbus could be buried within, but they failed to make such an examination as would insure

this fact. In great state the leaden case containing the body there found was transported to Havana and deposited in a niche, made for that purpose, in the cathedral of the capital city of the Spanish West Indies. In 1877, while repairs were being made to the cathedral in Santo Domingo City, another vault was discovered, containing another leaden casket, in which there were not only fragments of bones but a silver plate on which was the name "Don Cristobal Colon, discoverer of America." This and other proofs found showed conclusively, to every Dominican at least, that their worshiped hero was safe in the land he loved. One can imagine the rejoicing that the discovery of these precious relics brought to the inhabitants. It is certain that they were in marked contrast with the reception accorded the distinguished Admiral in Spain, when he returned in chains from his last voyage to the New World. Of course, the Spanish people would never admit that when they hauled down their flag on the American continent, for the last time, on January 1, 1899, they did not take with them all that remained of the man who had done so much for them and the world at large.

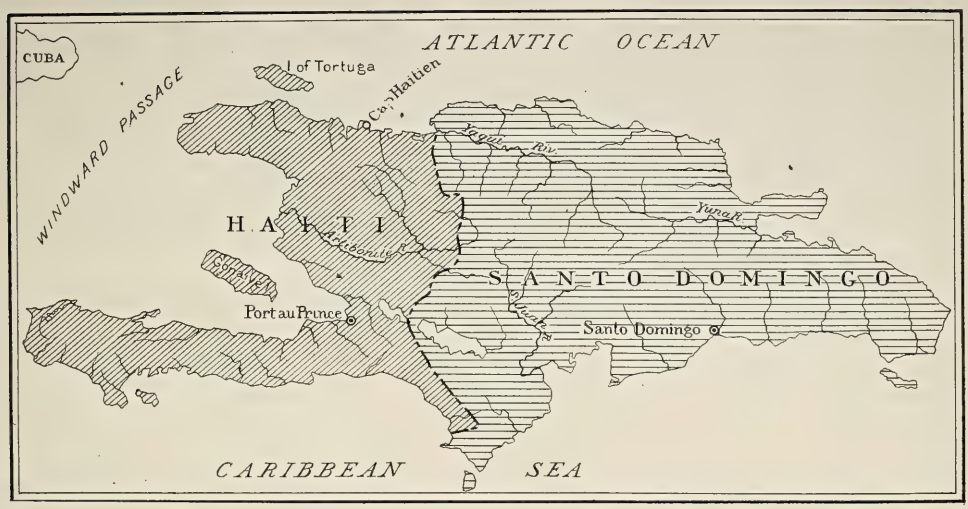
HAITI IS DEGENERATING TO A CONDITION OF BARBARISM

It is not possible within the limits of this paper to go into details regarding the turbulent history of Haiti. The fact that of its 21 rulers, from Dessalines to the one now holding power, four only have completed their terms of office, the most of them being driven out of the country, will show the general tendency of the people to revolution. History is here constantly repeating itself, summed up in the general statement that the "outs" are always struggling to get into power, while the "ins" are striving to retain possession of the spoils of office.

It is said that Haiti is getting blacker and blacker, the white element having been practically exterminated or removed from the island. It is not that the whites are unkindly treated here, but so many difficulties surround their holding of property that development is impossible, and the white people are reluctant to invest money in a country where there is such little promise of an income from it. It is the one country in the world where white blood is at a discount. There is, however, quite as much antagonism existing between the mulattoes and the blacks as is usually found between the blacks and whites in our own country, so the colored question is not eliminated from politics even here, and parties are generally lined up according to color, and as a rule the blacks and mulattoes alternate in the control of the executive offices.

In all its political history, Haiti, the beautiful, has been torn almost to shreds by its turbulent inhabitants, led on by a few inspiring chiefs, who rarely have had any other object in view than personal gain. The inhabitants themselves are naturally as gentle, except when overcome by the barbarous religious customs handed down from their African ancestors, as were the aborigines that Columbus found here. A traveler may pass from one end of the island to the other without being molested, unless his visit happens to be coincident with one of its many revolutions, when, owing to the poor shooting of the soldiers he runs more risk of his life than do the participants themselves. The Haitians do not consider it a crime to rob the government, and hence stealing from it is general. They rather regard it as a duty for the government to provide sustenance for the people, and if it does not do so, they use their prerogative to enforce their claim.

As practically 90 per cent of the population are descendants from the former slaves, who have no higher ambition than to possess sufficient means to supply the demands of their appetites, their wants are easily satisfied. The scant clothing required in the Torrid Zone is obtained without much difficulty, and as enlistment in the army is sure to gain both of these necessities, the natives naturally



SKETCH MAP OF HAITI

seek the life of a soldier, and as such they quickly transfer their allegiance to the highest bidder or, in fact, to any one offering a change. Owing to the general lack of enterprise among the lower classes of the people and the greed of the few who from time to time control the administration of the revenues, the only hope of the country is to have some strong man, such as Diaz of Mexico, revolutionize the methods of the government.

VOODOOISM STILL PRACTICED

No accurate history of Haiti can be written without a reference to the horrible sorcery, called the religion of Voodoo, which was introduced into the country with the slaves from Africa. Its creed is that the God Voodoo has the power usually ascribed to the Christian's Lord, and that he shows himself to his good friends, the negroes, under the form of a non-venomous snake, and transmits his power through a chief priest or priestess. These are called either king and queen, master or mistress, or generally as papa-lois and mama-lois. The principal act of worship consists of a wild dance, attended by grotesque gesticulations, which leads up to the most disgraceful orgies.

A secret oath binds all the voodoos, on the taking of which, the lips of the neophyte are usually touched with warm goat's blood, which is intended to inspire terror. He promises to submit to death should he ever reveal the secrets of the fraternity, and to put to death any traitor to the sect. It is affirmed, and no doubt is true, that on special occasions a sacrifice is made of a living child, or the "goat without horns," as it is called, and then cannibalism in its worst form is indulged in. Under the circumstances of taking the oath of allegiance, it should cause no surprise that the Haitiens claim that this is not true and defy any white man to produce evidence of guilt. But, notwithstanding, no one can read the horrible tales published by Sir Spencer Saint John, one of the British ministers to Haiti, which describes in detail the revolting practices of the voodoos, together with the proofs he brings to substantiate the truth of the allegations, without coming to the reluctant conclusion that cannibalism is resorted to in these meetings. Of course, no white man could long live on the island after having given testimony leading to the conviction of culprits in such cases, and therefore the negroes'

demand for proof can never be satisfied. Indeed, it is said that even some presidents who have openly discouraged the voodoo practices have come to violent deaths from this cause.

TESTIMONY OF AN EYE WITNESS

The character of the meetings of the voodoos, which take place in secluded spots in the thick woods, are well known, and I have been given a description of one of them from an eyewitness, who is an officer of our navy, which no one could hear without a shudder. He states in brief that one day while out hunting he abruptly ran into a camp of worshipers, which was located in a lonely spot in the woods, and the horrors he there saw made an indelible impression upon his mind.

When his presence was discovered he was immediately seized by a frenzied crowd of men and women, and for some minutes there did not seem to be a question but that his life was to be forfeited; but the papa-lois called a halt and a council, apparently, to determine what action should be taken, and while this was in session a handful of coin, judicously scattered, diverted the thoughts of the negroes for the time being from their captive. The usual sacrifice of a live white rooster was now brought on, seeing which the people were called back to their worship, and the ceremonies went on in his presence.

In the horrible struggle which took place for possession, the bird was torn literally to pieces, and he had no doubt that its accompaniment, the "goat without horns," would soon follow. While this was in progress his presence seemed to be forgotten, and, watching a good opportunity, he ran for his very life, not stopping until he reached the protection of his ship.

This officer has to his credit one of the most gallant deeds enacted during the Civil War, for which he received promotion by act of Congress, but his comrades on board his ship said they never saw a man more frightened than he was when he returned to them, and he himself says the memory of the event produces a horrible nightmare which he will never be able to overcome.

There is no doubt these voodoo practices keep the negro in touch with that "call of the wild" which perhaps even the white man, if restricted in civilizing influences and treated as they have been, might be led to follow; but it is to be hoped that education, which the best of the Haitiens are now acquiring for their own families and are striving to make universal in the land, will in a few years stamp out this horrible practice, with all its evils. It is well for us to consider whether we too may not expect some such acts of savagery to break out in our country if our own colored people are not educated for better things.

PEST HOLES OF THE WEST INDIES

Of the eleven ports of Haiti open to foreign commerce, Cape Haitien and Port-au-Prince are the largest and most progressive.

Cape Haitien, or "The Cape," as it is commonly called, is situated on the northwestern coast, at the foot of a hill that slopes back to the sea, with most picturesque surroundings. It has a commodious harbor and supports a population of 30,000 or 40,000 people. Under the French, it was the capital of the colony, and its wealth, splendor, and luxury gained for it the name of Little Paris; but now the structures erected by the French in colonial days are a mass of ruins, the parks overgrown with tropical weeds, the fountains chocked with debris, the gutters filled with filth, all producing pestilential emanations from which foreigners speedily run away, if they are forced into its environments.

Port-au-Prince, the present capital of the Republic, as well as its largest and most important city, is likewise most picturesquely located at the foot of hills, where one may escape from its blistering and filthy streets to mountain resorts that

would be popular if located in almost any country of the world. Unlike Cape Haitien, the city is cut off from the trade winds, to which this island owes so much for its salubriousness, and therefore it is hot; but still the traveler caught in the town may frequently felicitate himself when he reads that cities in our own country have higher temperatures by 10 to 15 degrees than is usually found here. The city is well supplied with the most delicious mountain water, and if its 60,000 inhabitants used it as freely as do Americans, it might be as clean as nature made it. As it is, it may well hold the palm for being the most filthy, foul smelling, and consequently fever-stricken city in the world. The gutters of the streets, which may be said to cover the whole road-beds, are filled with stagnant waters and are used as cesspools by the people. But for the torrential rains, which pour down the mountain sides and carry off all the filth into the beautiful bay, even a Haitien could not live there. But the bay, thus polluted, is quite as much of a menace to health as the city itself. During the visits of American men-of-war to the port, most of the time is spent in keeping the people from the pestilential vapors which emanate from the sea itself. The water of the harbor is so bad that it cannot be used even for scrubbing the decks of the ships.

I recall a painful incident which occurred here during one of my visits many years ago. A French man-of-war was anchored in the Port when our own cruiser entered it, and so rapidly were her people dying from the dreaded yellow fever that her flag remained at half-mast practically all during our stay there. A few weeks later we saw this same vessel in Hampton Roads, Virginia, and learned that all but five of her crew had died from the effects of the fever, after which they got some of the natives to sail the ship to our own ports; but even the natives were so reduced in number that it was necessary for the flag-ship of the French North American squadron to tow her consort to Halifax in an effort to freeze out the dreadful disease.

It is thus that the people have themselves made this island of "Little Spain" a veritable pest-hole.

But we should not forget, however, that they are our neighbors, and that we owe it to ourselves as a Christian nation to help them over the many pitfalls of popular government, which we by example led them to establish before they had gone through the preparation necessary for the proper use of universal suffrage, and which even our forefathers were not too well prepared to take up, after hundreds of years of enlightenment and study of political science and economy and republican principles.

Let us, moreover, not make a similar mistake to the one here enacted, lest our own wards go through the horrors which have so darkened the history of the Black and Brown republics.

THE MADURA TEMPLES

By J. S. Chandler, Auburndale, Massachusetts

THE last Hindu dynasty that reigned in South India was the Nayaka line of rulers; and the greatest of the Nayakars was Tirumala, who reigned from 1623 to 1659. Although frequently engaged in wars and expeditions, he found time to erect a vast palace, construct an immense tank or reservoir, and add great buildings to the temple of Siva that was the center of the city.

The temple had its shrines for the god and goddess and was especially extended on the god's side by a porch of a thousand pillars, built by one of Tirumala's ancestors.

The worship of the temple combined that of the two gods, Siva and Vishnu, symbolized in the marriage of Vishnu's sister to Siva. The goddess then was a representative of Vishnu. Now the Nayaka rulers were worshippers of Vishnu, so when Tirumala enlarged the temple he strengthened the Vishnu element by enlarging the goddess' side of the temple and making it equal to the god's portion.

Among other buildings, he constructed the "golden lily tank" and surrounded it by pillared colonnades. The walls are covered with paintings of local legends, including the 64 miracles that Siva is said to have worked in the region of Madura. These miracles are represented as sports, all the god's acts being play to him.

Between the tank and the shrine of the goddess stands the Porch of the Parrots, so called from the screeching caged parrots always kept in it. The pillars of this porch are monolithic statues, of which five represent the five Pandava heroes of the Hindu epic, the Mahabharata. These heroes are connected with Vishnu worship, another indication of Tirumala's connection with it.

The great wall surrounding the temple incloses nearly 14 acres. Outside the wall and opposite to the great pagoda of the god's portion, he constructed the choultry, or porch, that bears his name. It is 333 feet long and 105 feet wide, roofed with long slabs of granite, which are supported by four parallel rows of 124 sculptured stone pillars 20 feet high.

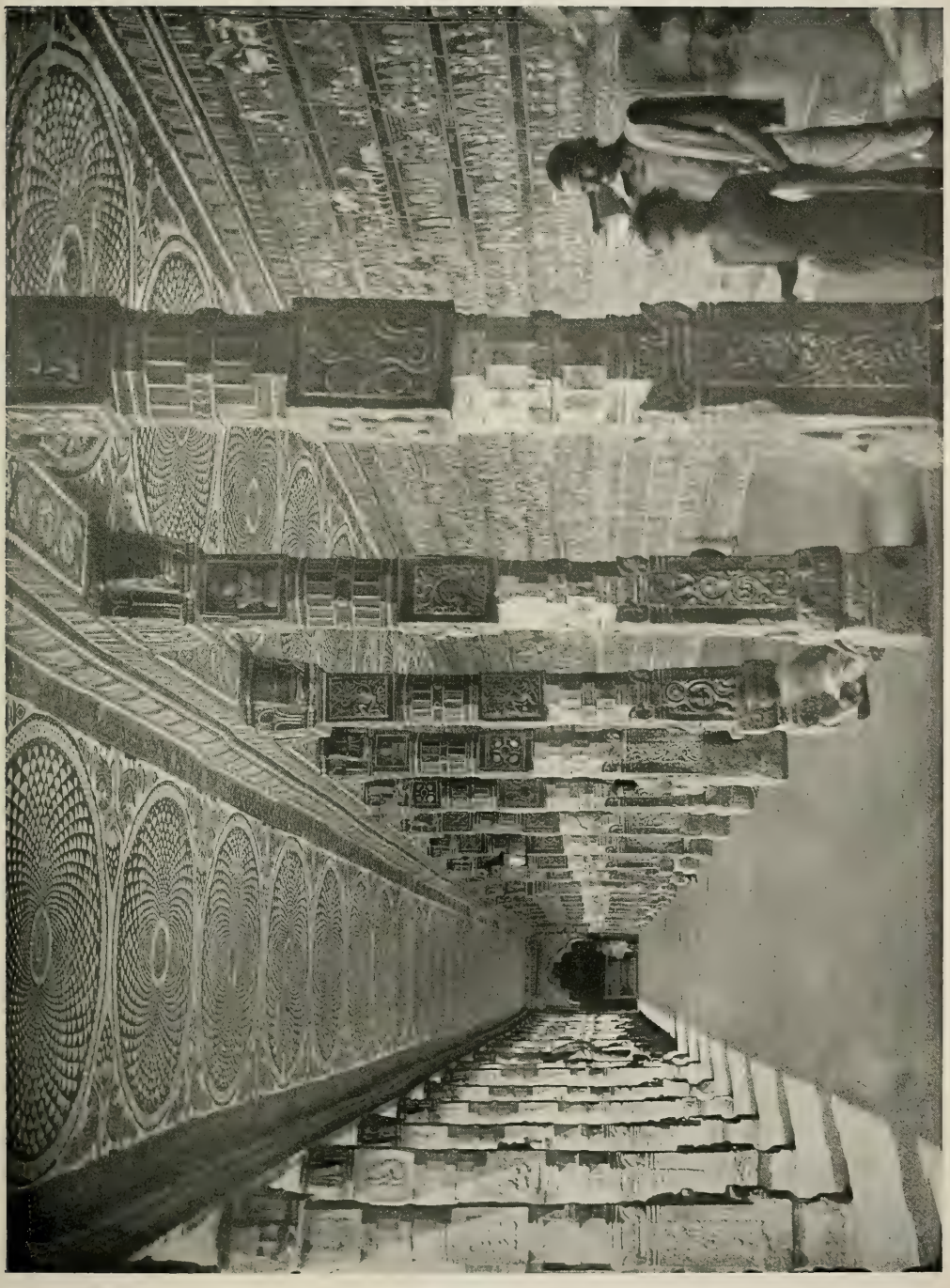
He also commenced, but left unfinished, a royal pagoda that was intended to be the finest tower in southern India. The door posts of the gateway through the completed story are formed of monoliths over 50 feet high and 3 feet wide, carved with exquisite scrolls of foliage.

His second structure was the raft tank, or Teppakulam, a reservoir measuring 1,000 feet on the north and south and 950 on the east and west, faced all round the sides with cut granite and surmounted by a handsome parapet and inside walk of the same material. In the middle of the reservoir is a square island, also faced with cut granite, on which, among green palms and flowering trees and jessamine gardens, is a small white temple with a pagoda tower, flanked at the four corners of the island with graceful miniature pagodas.

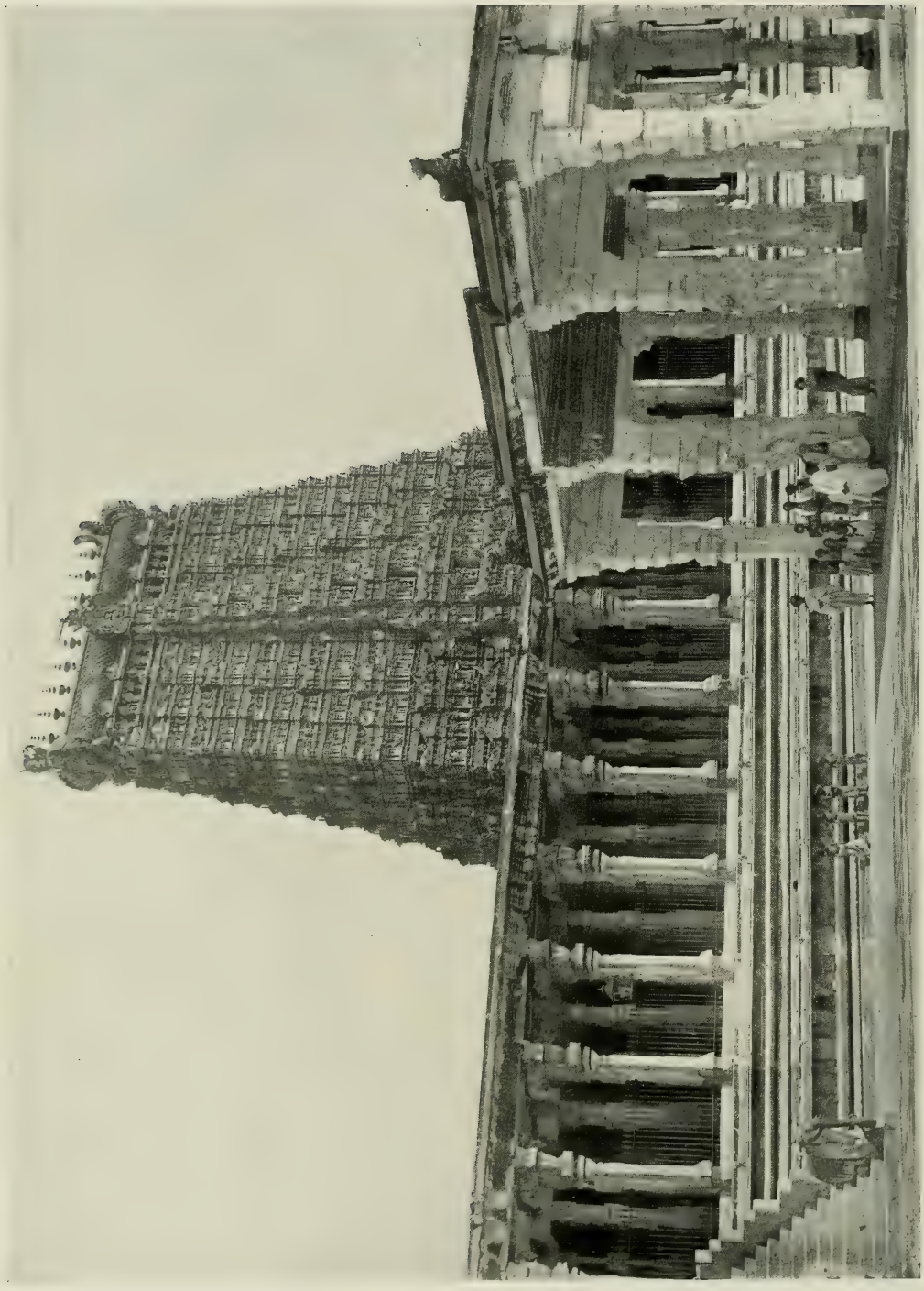
Every January the birthday of Tirumala is celebrated by a feast of lights, in which the whole tank is illuminated by thousands of little lamps on the inside of the parapet, while the images of the god and goddess are floated around the island on rafts built up like pagodas.

The third great work of Tirumala was the vast palace, an arched and domed structure with Saracenic features, in strong contrast to the rectangular forms of the temple buildings.

One courtyard indicates the magnificence of the whole. It is 252 feet long and 151 feet wide, round which runs a roofed arcade of great beauty supported on tall stone pillars 40 feet in height, connected by foliated brick arches. Round three sides of this court, at the back of the arcade, runs a very handsome line of lofty cloisters 43 feet wide and



COLONNADE OF GOLDEN LILY TANK, WITH PAINTINGS OF SIVA'S SPORTS Photo from J. S. Chandler



PORCH OF A THOUSAND PILLARS, MADURA

Photo from J. S. Chandler

GOLDEN LILY TANK, MADURA

Photo from J. S. Chandler

Photo from J. S. Chandler

TEPPAKULAM OR RAFT TANK, MADURA

upheld by three parallel rows of pillars supporting arches some 26 feet high. On the fourth side of the court the cloister is much deeper and finer, being altogether 105 feet wide, supported on five rows of huge pillars and roofed with three great domes. The central and largest dome measures 60 feet in diameter and is 73 feet above the ground, and has in front of it a superb portico, the pillars of which are 55 feet to the spring of the arches.

Originally this domed cloister constituted the public reception hall, and in its center stood a square building of black granite inclosing a chamber made of ivory. Within this chamber, again, there was a jeweled throne, on which the king was accustomed to take his seat at the great nine-nights festival, surrounded by all his banners or ensigns of royalty, and before which all kings were accustomed to do homage.

With this cloister as a specimen, we can accept the judgment of Father Proenza, a Jesuit who wrote from Madura in 1659, that the colossal proportions and astonishing boldness of the royal palace in Madura recalled the ancient monuments of Thebes.

THE BEAR HUNT

REPLYING to the numerous inquiries from readers as to the health of Dr Penrose, whose adventure with a grizzly was described in the NATIONAL GEOGRAPHIC MAGAZINE for February, we have much pleasure in saying that Dr Penrose has now entirely recovered his former strength and vigor and has already made plans for considerable hunting when the season opens.

In a letter to this Magazine Dr Penrose says that one of the most interesting features of his experience was the absence of pain "when being chewed by a bear. I have read that Livingstone had the same experience when chewed by a lion. Men rarely suffer pain with sudden traumatism. What pain I had came on some hours after the injury."

AMONG HONEST PEOPLE

Straw sandals (waraji) for sale by the roadside near Arita, province of Hizen, Japan. Country people weave these straw shoes in their leisure hours, and hang them from stakes by the roadside for sale. The traveler helps himself to a new pair of shoes, and drops the coppers in the bamboo cup. An old straw hat protects the shoemaker's stock from rain. The custom, formerly quite common in old Japan, is dying out, now that the new treaties have gone into effect, and foreigners are free to travel everywhere without passports. Photographed by Eliza R. Scidcore. Copyrighted by Harper Bros.

THE NATIVE OYSTERS OF THE WEST COAST

By Robert E. C. Stearns

Honorary Associate in Zoölogy, U. S. National Museum

IN reading Dr Smith's interesting article, "Our Fish Immigrants," in a recent number of this Magazine, his comments on the native oysters of the west coast attracted my attention. When we consider the fact that our "natives" are absolutely unpretentious, it would seem as if criticism should be tempered with mercy.

Several species and varieties of oysters* inhabit the long stretch of shore between Vancouver Island and San Diego, and doubtless these are found for a considerable distance north and south of the points indicated, as well as in the various bays and inlets connected directly or indirectly with the sea, especially that great body of inland water, Puget Sound. They also occur on the rocky margins of the islands in the Santa Barbara Channel and elsewhere on the islands and islets farther north. In bygone days they furnished food for the Indians, to a limited extent, as they do now to the palefaces. The abundance of abalones and "clams" of many species afforded an ampler supply to the "red men," as is proven by the remains of clam bakes in the mounds and shell-heaps (Kitchenmiddens) here and there, silent testimony of many old-time festivals.

The principal or best-known native oyster is *O. lurida,* which is the only species of commercial importance. It is always purchasable in the San Francisco markets and has been to my knowledge for nearly or quite fifty years. At the present time it is quotable on the retail stalls at 40 to 50 cents a *hundred,* the transplanted Atlantic *O. virginica* selling at 30 to 40 cents a *dozen.*

* *Ostrea lurida,* and varieties *expansa* and *laticaudata; O. concaphila,* also *O. amara;* the latter, however, belongs to a more southerly fauna.

The common "natives" of the British Isles and the general seaboard of northern Europe, *O. edulis,* according to common report, have the same "coppery flavor" as *O. lurida;* as they usually occur, they are about the same size. In the matter of flavor, it should be borne in mind that oysters of the same species vary considerably according to the locality or station where they occur. In the still, shallow waters of lagoons they are usually much saltier than in the proximate deeper water along the shores, that are more thoroughly washed by the daily tides. This was observed by me when on the Gulf coast of Florida in 1869. Presumably the above, and other factors not so easily perceived, affect the flavor one way or another.

The writing of this paper revives the memory of a plate of "natives" eaten at Astoria, in July, 1882, on the invitation of the late Justice Stephen J. Field, of the Supreme Court of the United States. By a happy coincidence we were fellow-travelers on the steamer from Portland, Oregon, to San Francisco. We had known each other for twenty years. Our oyster feast was therefore akin to a love feast, for the Justice was a genial companion. He pronounced the oysters *good,* and they *were* good; the best "natives" I had ever tasted. Locality, as before remarked, is to be considered when we discuss flavors.

This applies with equal or greater force to clams. *Mya arenaria,* the common long-necked clam, or "mananose," occurs in clean sandy stations; also in beds that are more or less muddy, in which case the flavor is impaired and the meats, as an epicure would say, have an "off taste."

Our native *O. lurida* is small; when "shucked," about the size of a half-dol-

lar piece; those from cultivated beds somewhat larger.

Although California (San Francisco County) is credited in the report of the United States Fish Commissioner for 1904 with producing 300,000 pounds, of the value of $92,000, the principal supply of that city is derived from certain localities in Washington, which state, according to the same report, exhibits a yield of 1,069,461 pounds (equal to 152,780 bushels), valued at $279,312, while the Oregon statistics show only 6,944 pounds, worth $1,488. It will be seen that the value of "natives" for the year, in the three states, makes a total of $372,800—no insignificant sum—being more than half the value of the annual output of the Atlantic or transplanted oyster.

The oyster-beds of Washington are subject to occasional severe climatic contingencies.

The Puget Sound oyster-beds are at Samish Bay, in Skagget County; Oyster Bay, in Mason County, and Mud Bay, Big Skookum, and North Bay, in Thurston County; on the ocean coast of Washington, Shoalwater or Willapa Bay and Toke Point cove. The Oregon region is pretty much restricted to Yaquina Bay, in Lincoln County.

On the night of January 13, 1907, the concurrence of an unusually low tide and a cold snap, the temperature having fallen to 18 degrees below the freezing-mark, was disastrous to the oysters and oyster-beds, both native and eastern plants, in many localities in different parts of Puget Sound. The loss was estimated at "several hundred thousand dollars," as "new beds will have to be planted, and it will be five years before the so-called 'Olympia oyster' will again be on the market."

All along our western coasts the tides range very large in January, running above average height and below average low water. Here (San Francisco) they ranged from 7 to 8 feet in January. At Olympia they must range nearly three times that (17.2 feet). In June there is a good range, but not equal to January. Of course there are certain conditions that decrease or increase the range. Strong southerly winds would run the low tide much below the average. A strong southerly gale on the coast at San Francisco has run the high water to 9.93 feet, or more than three feet above the average, as stated by Prof. George Davidson.

The low June tides mentioned by Professor Davidson, offer exceptional opportunities to the observer and collector of marine life along the shore. So large an area of the sea bed is uncovered that many forms not to be had between ordinary tides are then obtainable.

Then, too, the famous geoduck,* known to science as *Panopea generosa,* the "Giant clam of Puget Sound," is accessible. It sometimes reaches the weight of *sixteen pounds.* From an epicurian point of view, it holds the same relation to other edible mollusks that woodcock and Chesapeake Bay "canvas-backs" do to other birds, and "stewed terrapin" to other dainties. The late Professor Baird would have given a thousand or two dollars to have successfully planted this bivalve on the Atlantic side of the continent.

South of the boundary line of the United States and Mexico, on the outer shores of the peninsula of Lower California, as well as in the Gulf of California, 600 to 700 miles long, the two shores making a reach of 1,200 to 1,400 miles, we have a region which we may safely assume includes many localities exceptionally well adapted for oyster culture. The general mollusk-fauna of the Gulf is particularly rich in number of species and abundance of individuals.

This fauna includes several species of oysters, of which two more are of good, merchantable size and worthy of mention, as sooner or later they will find a place in trade quotations. One of these

* Pronounced *gwo'-duck;* also known as *Glycimeris generosa.* See my paper on above, with numerous figures, in Bulletin of the U. S. Fish Commission, vol. III, No. 23, October 19, 1883, and Annual Report of the American Fisheries Society, April meeting, 1885; also *Forest and Stream,* May 28, 1885.

closely resembles the Atlantic *O. virginica,* and was so referred to as long ago as 1863 by Dr. P. P. Carpenter in his list of west coast shells,* and *O. iridescens,* of somewhat darker semi-nacre. There are many examples of these in the National Museum. The first of the above was collected in 1850, or about that time, at La Paz, by Major Rich, of the U. S. Army, and is further credited to Margarita Bay, on the outer shore of the peninsula (Xantus Collection, 1860).

As many as forty years ago the importation of these Gulf oysters was attempted by San Francisco parties. The enterprise failed for some reason—presumably, uncertainty of transportation and other requisite facilities. With quick service by railroad, which is certain to come before many years, and the necessary ice plant or refrigerator cars, *Ostrea-culture* in the Gulf of California will sooner or later be a profitable industry, as the general region is immune from some of the perils that are so discouraging to enterprises of this kind in more northerly latitudes, for *natural increase* could be safely counted upon.

For a self-perpetuating stock for the northern waters, as long ago as 1886, at the request of Professor Baird, I answered a letter addressed to him by parties in San Francisco, and recommended experimenting with some edible species from Japan, as being more likely to propagate than any species from a more southerly source, temperature of waters considered. This very desirable experiment remains to be tried.

In writing of the Geologic age of the region about Berkeley, the late Prof. Joseph Le Conte† said: "*Oysters,* such as would astonish a latter-day California, existed in such numbers that they formed great oyster-banks. Their agglomerated shells, each shell five or six inches long and three to four inches wide form masses three feet thick and extending for miles. These are found in the Berkeley Hills; but elsewhere in California. Miocene and Pliocene oysters are found thirteen inches long eight inches wide and six inches thick. Alas for the degeneracy of their descendants, the modern California oyster. And yet, upon second thought, there may be nothing to regret. It may be that in the gradual decrease in *size* the *flavor* has been correspondingly intensified. It may be that what was then diffused through a great mass of flesh, and therefore greatly diluted, was all conserved and concentrated into the exquisite piquancy characteristic of the little California oyster of the present day. If so we are consoled."

* Report to the British Association, 1863 (pp. 542 and 621), Smithsonian Miscellaneous Collections, No. 252. Washington, December, 1872.

† "A Berkeley Year," &c. Published in Berkeley, California, in 1898.

TOPOGRAPHIC MAPS ISSUED BY THE GEOLOGICAL SURVEY IN 1907.

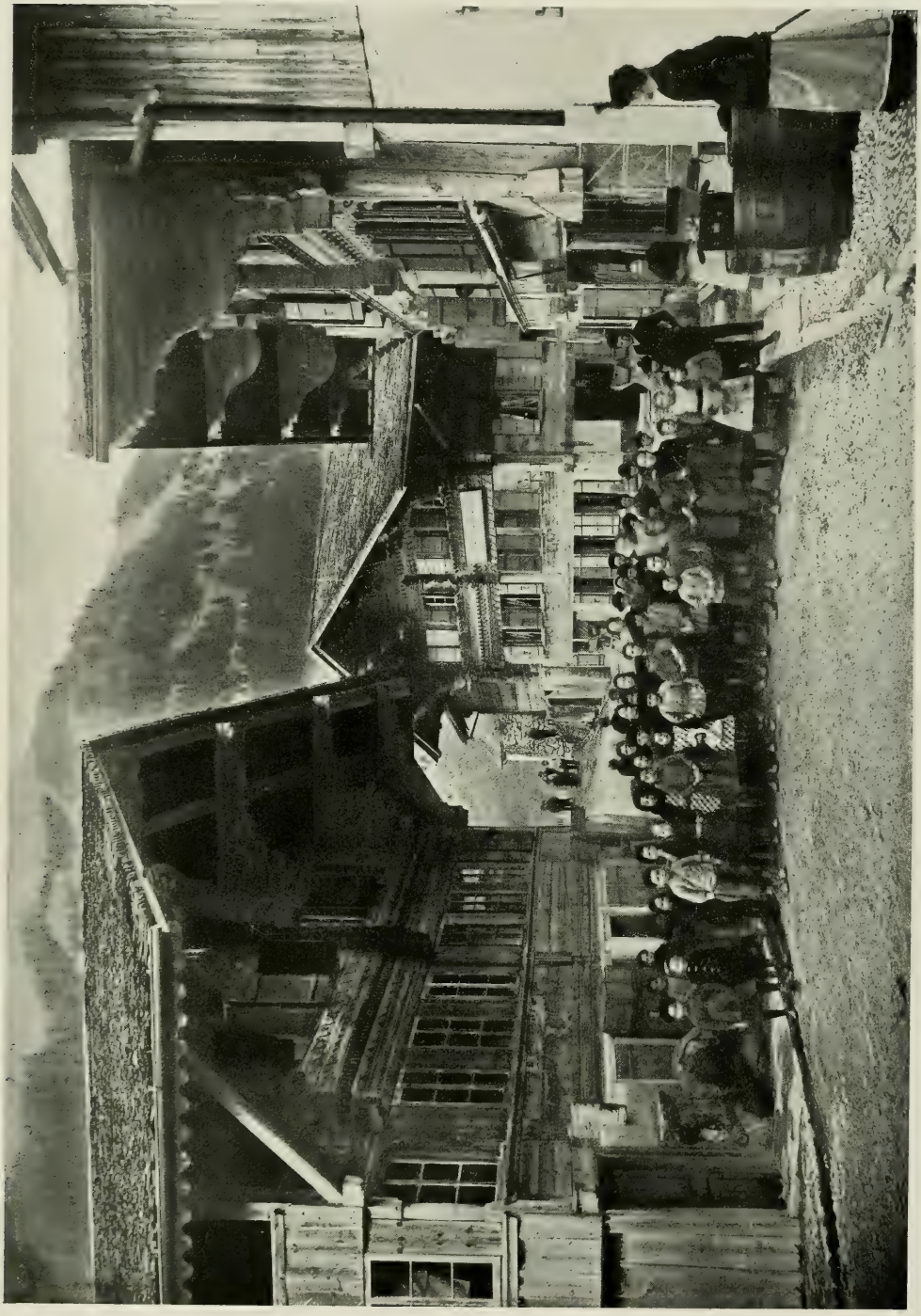
The new topographic maps published by the United States Geological Survey in 1907 comprise 104 sheets and cover areas in 32 states and 2 territories, as shown by the following lists. (Address Director U. S. Geological Survey, Washington, D. C.)

State.	Quadrangle.
Alabama	Bessemer Special
Do.	Birmingham
Do.	Leeds
Alaska	Casadepaga
Do.	Solomon
Arizona	Camelsback
Do.	Fort McDowell
Do.	Sacaton
Do.	Vishnu
California	Colusa
Do.	Davisville
Do.	Dunnigan
Do.	Holtville
Do.	Indian Valley
Do.	Mount Whitney
Do.	Olancha
Do.	Tesla
Do.	Woodland
Do.	Yosemite Valley
Colorado	Mount Olympus
Do.	San Cristobal
Georgia	Dahlonega Special
Do.	Talbotton
Idaho–Montana	Cœur d'Alene Special
Illinois	Belleville
Do.	Eldorado
Do.	Mahomet
Do.	Springfield
Illinois–Indiana–Kentucky	New Haven
Iowa	Decorah
Do.	Des Moines

Kentucky ..... Louisville
Kentucky–Indiana–Illinois .....New Haven
Maine .....The Forks
Maryland ..... Laurel
Do. ..... Relay
Michigan ..... Marquette
Do. .....Marquette Special
Montana .....Kintla Lakes
Montana–Idaho.....Cœur d'Alene Special
Nebraska .....Nebraska City
Nevada .....Ely Special
New Hampshire ..... Sunapee
New Jersey–Pennsylvania ..... Trenton
New York ..... Eden
Do. ..... Lake Pleasant
Do. ..... Massena
Do. .....Piseco Lake
Do. .....Port Leyden
Do. ..... Sangerfield
Do. .....Tupper Lake
Do. ..... Winfield
North Carolina ..... Beckford
North Carolina–South Carolina.....Charlotte
Do. ..... Cowee
Do. ..... Saluda
North Dakota ..... Bismarck
Do. ..... Wyndmere
Ohio ..... Arlington
Do. ..... Blanchester
Do. ..... Bluffton
Do. ..... Bristolville
Do. ..... Brookville
Do. ..... Dayton
Do. ..... Garrettsville
Do. .....Greenville
Do. ..... Jefferson
Do. ..... London
Do. ..... Mentor
Do. ..... South Charleston
Do. .....Upper Sandusky
Do. .....West Manchester
Do. ..... Zaleski
Ohio–Pennsylvania ..... Andover
Do. ..... Kinsman
Oklahoma ..... Chandler
Pennsylvania ..... Claysville
Do. ..... Greensburg
Do. ..... Honeybrook
Do. ..... Millerstown
Do. ..... Neshannock
Do. .....New Bloomfield
Do. ..... Pittsburg
Pennsylvania–Ohio ..... Andover
Do. ..... Kinsman
South Carolina ..... Sharon
South Carolina–North Carolina.....Charlotte
Do. ..... Cowee
Do. ..... Saluda
South Dakota.....Belle Fourche
Do. ..... Elk Point
Do. ..... Redwater
Utah .....Cottonwood Special
Do. .....Frisco Special
Do. .....Iron Springs Special
Utah–Wyoming .....Gilbert Peak
Virginia ..... Hampton
Do. .....Norfolk Special
Do. ..... Yorktown
Washington ..... Blaine
Do. .....Mount Adams
West Virginia ..... Arnoldsburg
Do. ..... Belington
Do. ..... Elizabeth
Do. ..... Harrisville
Do. ..... Holbrook
Do. ..... Kingwood
Do. ..... Ripley
Do. ..... Spencer
Do. ..... Thornton
Wisconsin ..... Evansville (resurvey)
Do. .....Sun Prairie
Do. ..... Geneva–Racine
Wyoming ..... Kirwin
Do. ..... Younts Peak
Lettering and conventional signs.

Four of the maps listed above—the Cœur d'Alene Special (Idaho–Mont.), the Geneva–Racine (Wis.), the Vishnu (Ariz.), and the Yosemite Valley (Cal.)—are much larger than the regular atlas sheets of the Survey and are sold at 10 cents each. The other sheets are of standard size—16½ by 20 inches—and are sold at 5 cents each in lots of less than 100; the wholesale rate for the standard sheets is $3 a hundred.

Much of the work represented by these maps was done by coöperation between state surveys and the National Survey. California, Ohio, New York, Pennsylvania, and West Virginia make generous appropriations for work of this kind. Other states coöperating are Illinois, Kentucky, Maine, Maryland, Michigan, North Carolina, and Oklahoma. In addition to those listed, maps of Sacramento Valley, Cal., from A to N, on a scale of 1:24000, sold at 40 cents each, were published in coöperation with the state. These are photo-lithographs prepared from the same base from which the regular sheets are made.



SCHOOL CHILDREN IN A SWISS TOWN

Photo from Mrs Gardiner Greene Hubbard

Photo from Mrs Gardiner Greene Hubbard

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Friday, February 21—"Persia, Past and Present," by Dr A. V. Williams Jackson, of Columbia University. Illustrated with unusual pictures taken by Professor Jackson on extensive journeys through the ancient kingdom.

Friday, February 28—"Holland's War with the Sea," by Prof. James Howard Gore, George Washington University. The romantic and picturesque in Holland's national life will be described by Professor Gore, and illustrated with lantern slides.

Friday, March 6—"The Missions of California," by Hon. Joseph R. Knowland, M. C. from California. Illustrated.

Friday, March 13—"Our Immigrants," by United States Senator Dillingham, of Vermont. Illustrated.

Friday, March 20—"Reclaiming the West," by Mr C. J. Blanchard, U. S. Reclamation Service. Mr Blanchard will describe the opening to settlement of the lands irrigated by the great government works. Illustrated.

Friday, March 27—"The Physical Geography of the Sea," by Rear Admiral Colby M. Chester, U. S. Navy. Illustrated with moving pictures and lantern slides.

Friday, April 3—"Cathedrals, Mosques, and Temples of the World," by Hon. O. P. Austin, Chief U. S. Bureau of Statistics. Illustrated with moving pictures and lantern slides. (Last lecture of the season.)

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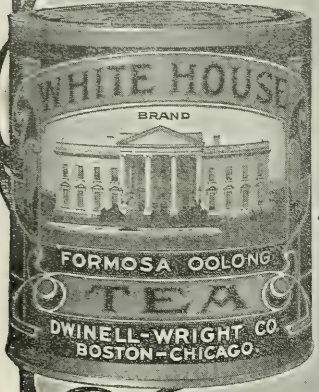

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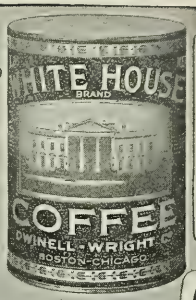

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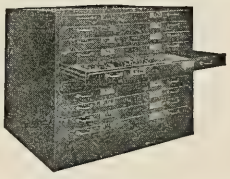

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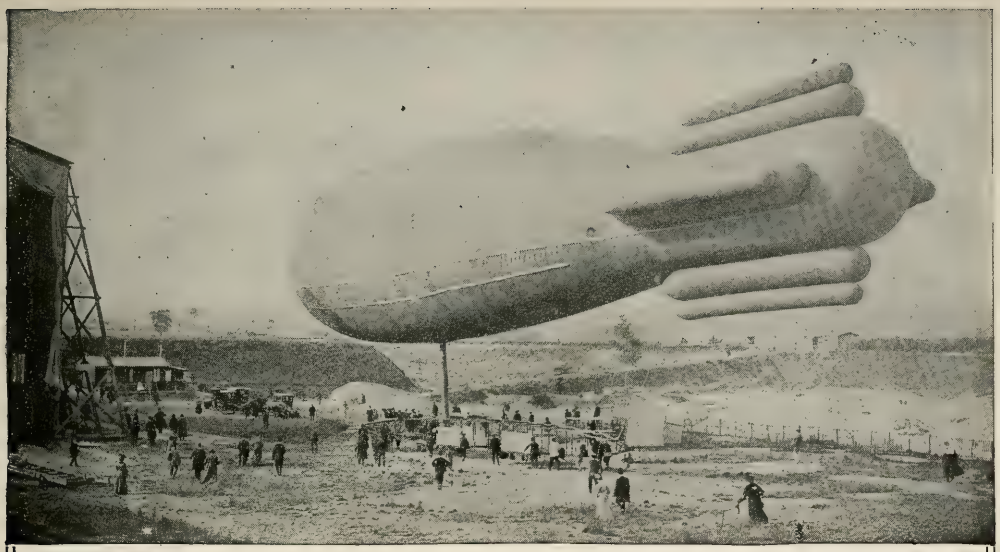

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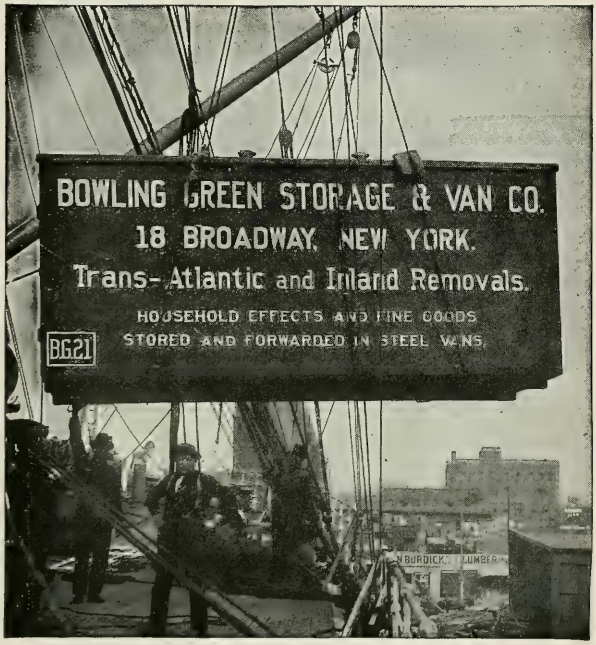
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THE NATIONAL GEOGRAPHIC MAGAZINE

ALONG THE OLD INCA HIGHWAY

BY HARRIET CHALMERS ADAMS

With photographs by the author

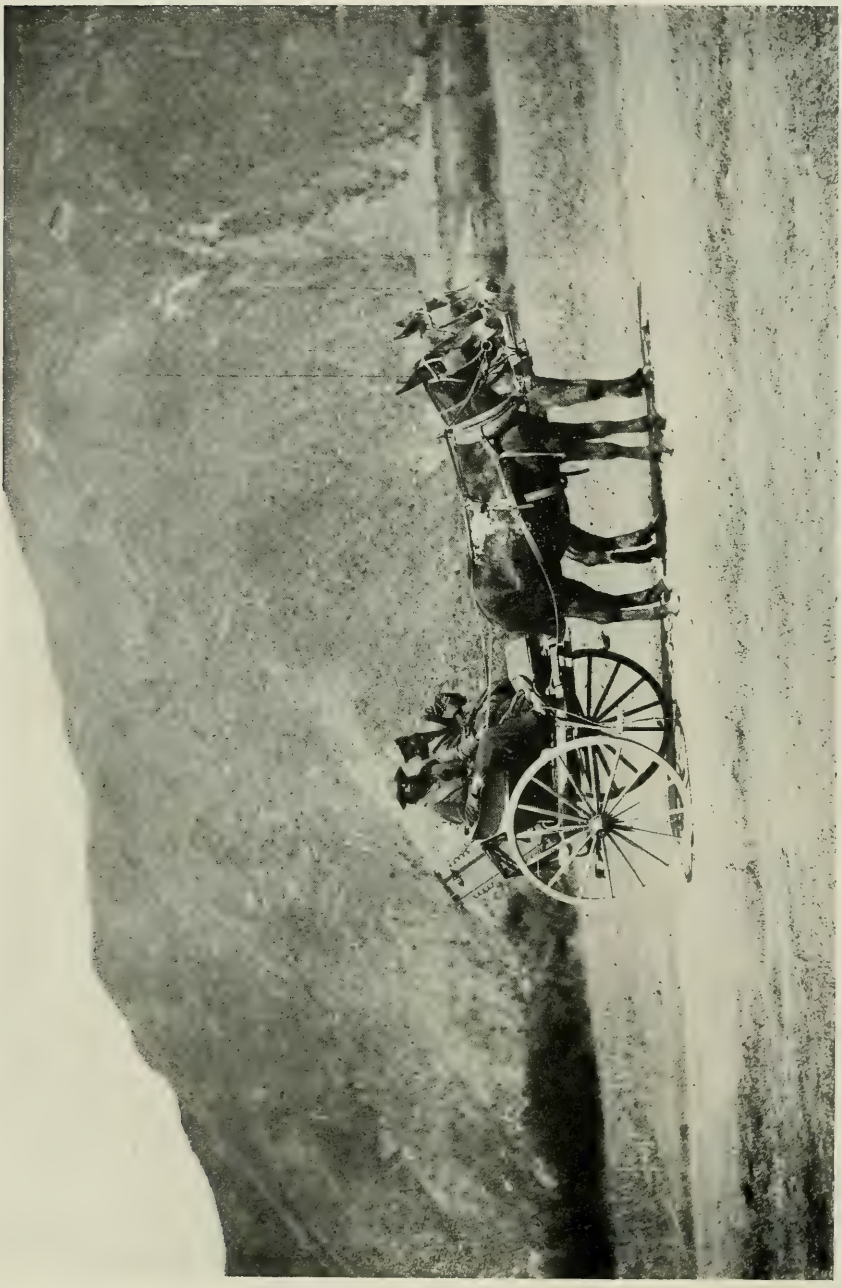
ON a June morning a season or two ago, we started out from Sicuani, then the terminus of the Southern Railway of Peru, for Cuzco, ancient capital of the Incas. We had decided not to engage passage on the regular stage coach which connects Sicuani with Cuzco, but to journey instead by private vehicle, that we might loiter by the wayside to study the *Quichuas,* the remnant of a once mighty people who prospered in this highland country. Remembering the Spanish proverb, "If you can't get what you like, like what you get," I pretended to be quite enthusiastic over our equipage, which consisted of a rickety cart holding the two of us and our *cholo* driver, two slow but well-meaning mules in the lead. The Peruvian *cholo* is of mixed Indian and Spanish blood and considers himself in every way superior to the pure-blooded *Quichua.*

From Sicuani we traveled over the old Inca highway, worn by the feet of many pilgrims, of many llama trains, in the days before the Spanish conquest. The home life in these *bolsones,* the fertile mountain basins which are linked with the valley of Cuzco, is little changed since the long ago. The people are now of Roman Catholic faith and a church tower marks the site of each village, oxen and other domestic animals have been introduced; but the crude huts, the homespun dress, the primitive method of agriculture, belong to centuries long past.

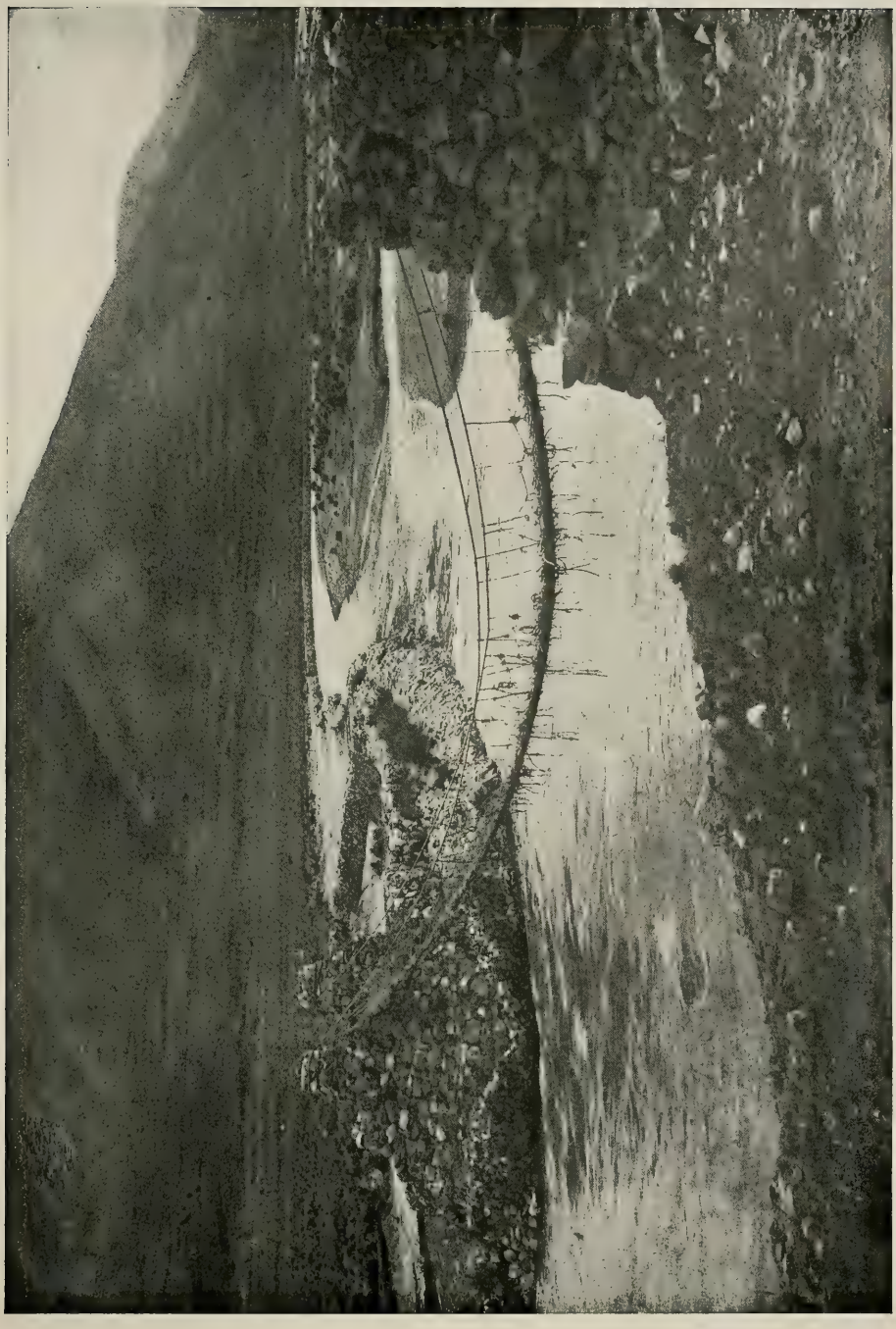
We were so fortunate as to make this journey at harvesting time, and while farming in the World's Roof Garden isn't exactly "up to date," it is most interesting to the traveler. In threshing the grain the men drive the oxen about in a circle, encouraging the poor animals by yanking their tails; in winnowing, the grain and chaff are blown out through a horn, that the wind may separate them. A crooked stick is used in plowing, but what the *Quichua* farmer lacks in modern machinery he makes up in the decorative head-dress of his oxen.

In costume these mountaineers are most picturesque. Throughout the Andean highlands the headcovering changes with the locality, and on the road to Cuzco it consists of a large, flat hat, usually of homespun, dyed bright blue or red, bedecked with tinsel (a modern innovation). Both men and women wear this headgear. The men are attired in knee-breeches, short jackets, and *ponchos;* the women in short skirts and low-cut blouses. They are bare-legged and seem scantily clad at an altitude of 11,000 feet above the sea.

In the villages through which we passed the huts were built of mud and thatch,



OUR EQUIPAGE ON THE ROAD TO CUZCO—MRS ADAMS AND THE CHOLO DRIVER

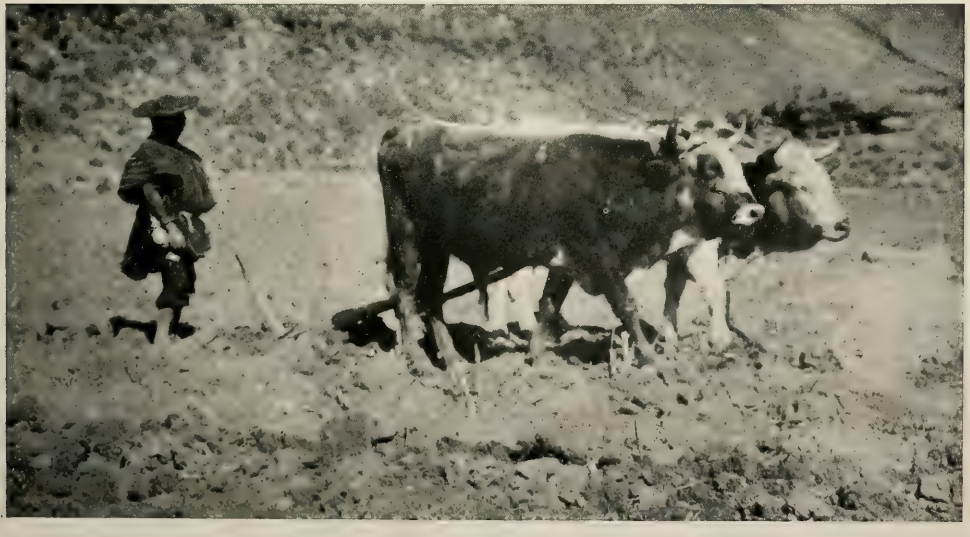


FOOT-BRIDGE OF WOVEN WILLOW OVER RIVER VILCANOTA, ON THE ROAD TO CUZCO

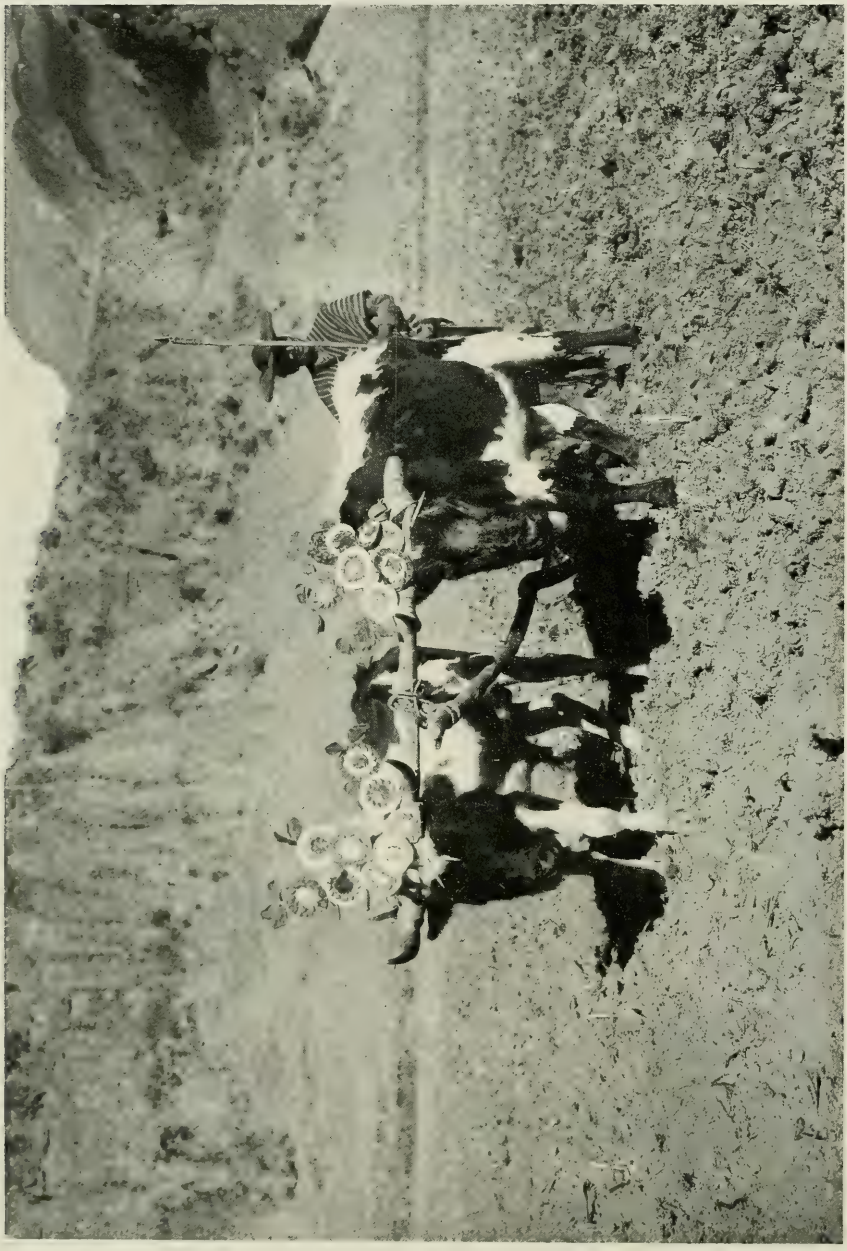
FOOT TRAVELERS

INCA BURIAL TOMB AND ANDEAN HUT OF MUD AND THATCH

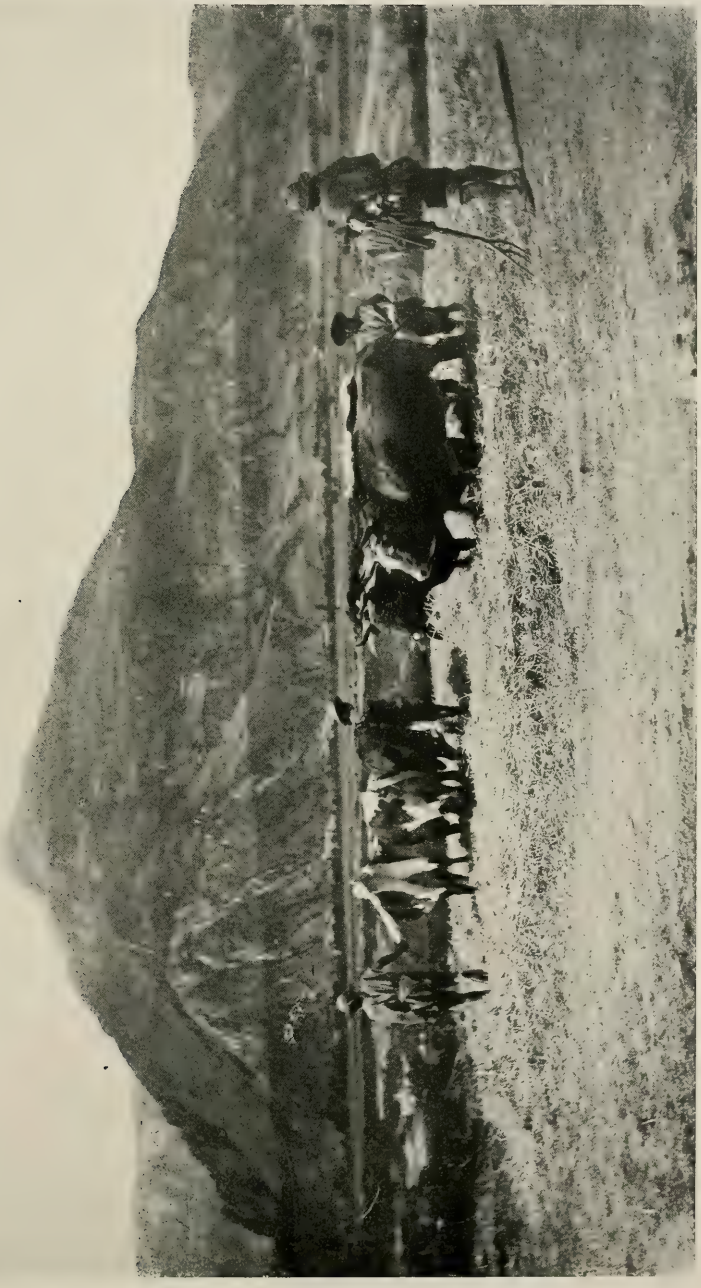
QUICHUA FARMERS



PLOWING AT AN ELEVATION OF 11,000 FEET



WHAT THE QUICHUA FARMER LACKS IN MODERN MACHINERY HE MAKES UP IN THE DECORATIVE HEAD-DRESS OF HIS OXEN



HARVESTING ON THE ROOF OF THE WORLD

GATHERING FUEL FOR THE HOME

and untanned hides covered the doorways; within there were no furnishings save the few crude cooking utensils. The head of the household evidently "slept on the mat with the dog and the cat, the rest of the family close by," no better cared for than his llamas in the nearby corral.

The graceful llamas, little cousins to the camel, are closely associated with my remembrance of the Andean highlanders. Domesticated long ago, they are the best friends of the mountaineers, furnishing wool for clothing, fuel, bearing burdens patiently, calling for little or no care, as they graze by the wayside and require little water. As in the days of Atahulpa, so today a train of laden llamas slowly journeys toward Cuzco; in the rear a *Quichua* boy and girl, both spinning as they walk, using primitive implements, a baby strapped to the young mother's back. The llamas turn their heads quickly to right and left, their curious eyes ever shifting; the young man and woman constantly chew the dried coca leaf, which deadens hunger, cold, and fatigue, and watch for the flag which cheers, which waves triumphant on this ancient highway—the little, white flag which marks a hut where *chicha* is sold.

Chicha is the Peruvian drink made from fermented corn. It is highly intoxicating and its victims are legion on *fiesta* days. There are, as I remember, about seventy feast days of the Church celebrated annually in Peru, and the *cholos* and *Quichuas* mark these days less by religious fervor than by an all consuming passion for *chicha.* We decided that *chicha* was an acquired taste; it is as bitter as the Mexican *pulque.* Another Peruvian drink is *aguadiente,* a strong native brandy.

The fare of the highlanders is meager,

REAR GUARD OF A LLAMA TRAIN

BEGGARS

QUICHUA GIRLS RETURNING FROM MASS

A FULL-BLOODED QUICHUA, DESCENDANT OF A PEOPLE WHO LAID THESE GREAT STONES

THE PATIENT BEASTS OF BURDEN OF THE ANDEAN HIGHLAND

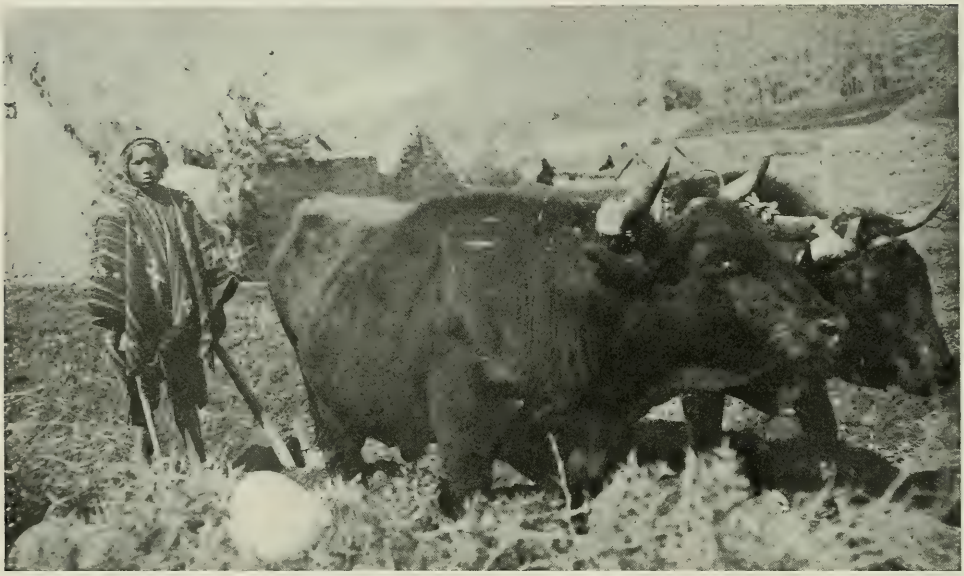
RESTING AT A WAYSIDE HUT

"AS IN THE DAYS OF ATAHUALPA"

THE DECORATED LEADER OF THE LLAMA TRAIN

"WITH HEADS BOWED AND UNCOVERED THEY STOOD, AS IN THE LONG AGO, GREETING THEIR BELOVED CUZCO, SACRED CITY OF THE SUN"

A HERD OF LLAMAS OFF DUTY. THE PYRAMID IS A MIRAGE, THE RESULT OF A DOUBLE EXPOSURE



FARMING IN THE WORLD'S ROOF GARDEN

consisting of maize, *chuño,* the frozen potato, *cholona,* dried goat or mutton. and *quinua,* a cereal which thrives at high altitudes. We passed many little fields brightened by the reddening *quinua,* its tall stalks waving like corn. The valleys through which we journeyed were narrow, bordered on either side by steep mountain walls. High up on the hillsides were cultivated patches, little farms which seemed in danger of falling over into the swiftly flowing river below. This river is the Vilcanota (we had seen its birth back in the snows at the Pass of La Raya); beyond Cuzco it is called the Yucay; farther on, the Ucayali, and it is the longest formative branch of the Amazon. Our road followed the river's windings and crossed bridges laid by the Colonial Spaniards on old Inca foundations.

Our first view of these massive stones was at the ruins of the Temple of Viracocha, about half a mile from the highway. One great wall alone remains of this once splendid edifice, said to have been erected by the eighth Inca ruler. We saw many lesser ruins of the ancients before reaching Cuzco—forts, evidently, guarding the approach to the capital.

We managed to pick up a few words of the *Quichua* language, which we had need of later on trips beyond Cuzco, where little or no Spanish is spoken. On this main highway Spanish is now the universal tongue, although the *Quichuas* cling to their own expressive language, and their sullen demeanor shows their hatred for the white man and the half-breed. They speak Spanish when they must, but most ungraciously.

My pleasantest recollection of this drive of two days is of the early evening, when we heard the shepherds playing on their pipes. From the hillsides where the flocks grazed came the clear notes, monotonous but sweet, and the music carried me back to Peru's olden days. As we drove through these Andean valleys, past villages and *haciendas,* each church tower, each touch of a more modern civilization, reminded me of one of the saddest histories ever told, of the downfall and slavery of a once contented and prosperous people, now broken in spirit, degenerated; yet in their hearts there remains a love for their lost idols, a reverence for their old religion. When we at last reached the heights overlooking Cuzco

RUINS OF THE TEMPLE OF VIROCOCHA, ABOUT HALF A MILE FROM THE HIGHWAY

the sunset glow was gilding its many towers, and near us on a worn spot on the highway stood a group of poorly clothed *Quichuas*, with sad, unenlightened faces, forgetting their cruel Spanish masters, forgetting their Church and their Cross. With heads bowed and uncovered, they stood as in the long ago, greeting their beloved capital—Cuzco, Sacred City of the Sun.

HOME-MAKING BY THE GOVERNMENT*

An Account of the Eleven Immense Irrigating Projects to be Opened in 1908

BY C. J. BLANCHARD

STATISTICIAN, U. S. RECLAMATION SERVICE

WE have come upon a time in our national life when the question of providing homes for our people bulks larger than ever before. The time is not far distant when it will become acute. The rapid narrowing of the limits of our unoccupied public domain and the tremendous increase in land values in all the settled sections of the United States render it yearly more difficult for the man of small means to get a foothold on the land. There is congestion today in many of our cities, and the menace of a great population underfed and poorly housed looms more darkly each year. So great is the land hunger that already a quarter of a million families, comprising some of the best blood of the nation, have expatriated themselves and taken up new homes under a foreign flag. What is the use of preaching love of home and country when we offer nothing but crowded tenements to the toiler who seeks to earn a roof over his family?

Our nation's greatness has its foundations in the home of the man whose feet are firmly planted upon his own land. There is no national stability in a citizenship born and reared in tenements. Patriotism, loyalty, and civic pride are not bred and fostered in the crowded centers of population. The destiny of the nation is foreshadowed in the provisions made for the prosperity and contentment of its citizens. An assurance that the great mass of our people shall reside in homes of their own is an insurance that our future will be one of stability and progress.

The home-making instinct is a well-developed trait in American character. Our forefathers who landed on the bleak and inhospitable shores of New England, their descendants, the pioneers who conquered the middle West, and the Argonauts of this generation who crossed the trackless plains were impelled by this instinct more than by the love of adventure or the lure of gold to wander forth into strange lands.

From the very inception of our Republic our legislators have recognized that it was a national duty to render the acquirement of homes as easy as possible. This recognition was shown in liberal grants to the defenders of the country in Revolutionary times, and later in the beneficent homestead law which opened to settlement the Mississippi Valley. It has been recognized since by the enactment of other statutes making easy the acquirement of public domain. Areas greater in extent than many of the original states have been donated for the purpose of making habitable the unutilized lands of the people. At one time the

* An address to the National Geographic Society, March 13, 1908.

PUMPING BARGE OF THE U. S. RECLAMATION SERVICE: WILLISTON PROJECT, NORTH DAKOTA (SEE PAGE 252)

property of the nation embraced 1,800,000,000 acres; today it has been reduced to less than 500,000,000 acres. Much of it was squandered by the government, it is true, but out of that public domain twenty vigorous commonwealths have arisen, and an agricultural empire has come into being that is today the marvel of the world.

The remaining public lands occupy two distinct agricultural regions, differing materially in climate, soil, and crops. West of the Missouri River lies a vast region extending westward to the foothills of the Rocky Mountains and from the Panhandle of Texas northward into Canada. It is known as the Great Plains. For many years the vast region has been utilized as a public common. Countless cattle and sheep have had free access to it and have overgrazed it. Its administration is still one of the most vexing problems before Congress. The pioneer of the Great Plains was the cattleman. He farmed but little, and from the nature of his business and the methods of operation, as a rule, wanted no neighbors.

The real home-builder, who undertook to subdue the plains to agriculture, encountered many difficulties. In many sections there was no timber and he was forced to build his house of sod or adobe. He found the streams were not dependable; they were dry in summer, when water was most needed. Nature, however, provided an inexhaustible supply of underground water, which the farmer pumped into small reservoirs and then led to his garden and orchard and supplied his live stock. He harnessed the wind, which blows almost constantly on the prairies, and made it a cheap and useful servant for his work.

Within the past 15 years there has been an awakening to the opportunity which lies in the Plains area, and settlements have moved westward with such remarkable rapidity that the day of the broad,

free range, with the old, careless, and often inhuman methods of stock-raising, is about over. The day of smaller flocks and herds, winter fed and fattened on home-grown forage, is at hand.

PROJECTS IN NORTH DAKOTA

In the Great Plains area the Reclamation Service has in process of construction 11 projects involving an expenditure of $18,740,000 and the reclamation of 500,000 acres. Several of these projects are unique, and in their engineering features are deserving of extended description. All have reached a stage of construction where water will be available this season, and the hundreds of new homes which dot the prairies show that the settlers are preparing to put it to use.

Three of these projects are located in North Dakota, in the valley of the Missouri River, and in the vicinity of the town of Williston. The Missouri River at this point is a whimsical stream, habitually cutting its banks and changing its channel, so that the engineers find it impracticable to locate any permanent structure for the diversion of water by gravity.

Fortunately great beds of lignite were discovered in the vicinity on public land, and the engineers proposed that the government should turn coal miner, mining its own coal and developing power therefrom. A large power-house was erected at the mine and power is now conveyed electrically to the river. An exceedingly unique plan was devised to overcome the eccentricities of the Missouri. The pumps are placed on floating barges, which will accommodate themselves to changes in the river channel and in the water level. The water is delivered through pipes with flexible joints into reservoirs, and from these basins is pumped into the canals. These reservoirs serve to settle the silt, large quantities of which are carried in solution by the Missouri River. The central plant, near Williston, supplies power to two of these projects.

A heavy influx of settlers is anticipated this spring to take up the lands to be irrigated. Diversified and intensive farming by irrigation will bring about a great change in the agricultural methods now in vogue in this section. The cultivation of alfalfa, sugar-beets, vegetables, and such fruits as apples, cherries, grapes, melons, and berries of all kinds, for which this region is adapted, will doubtless create a prosperous community here in a few years. This project is on the Great Northern Railway.

LOWER YELLOWSTONE PROJECT

Not far from here, in the Lower Yellowstone Valley, and embracing 66,000 acres of land in Montana and North Dakota, is the Lower Yellowstone project. The settlement of this large area has been progressing rapidly, and aside from a few thousand acres of railroad lands, which will be sold this spring, about all the land is filed upon. The works include a timber-covered, rock-filled dam 700 feet long, headworks of concrete, and a huge canal 67 miles long and several hundred miles of laterals and small ditches.

HUNTLEY PROJECT, MONTANA

Up the Yellowstone about 200 miles is the Huntley project, which was completed last June. It is located 12 miles east of Billings, Montana, and embraces 30,000 acres of land, having a general elevation of 3,000 feet above sea level. The irrigable area has been divided into 589 farms of 40 acres each, and about half of these have already been filed upon. The project offers unusual advantages for the practical farmer of small means to secure a good home, whereon by his own industry he can secure a comfortable living. The climate here is delightful and the soil of exceptional fertility, producing bountiful crops when watered. Cereals and alfalfa are the principal crops, although apples, small fruits, and garden vegetables do well. On account of the fine range country surrounding the project, alfalfa will always be a staple product. It produces about five tons to the acre at present and is worth $5 a ton in the stack. A sugar-beet factory is now in operation at Billings and the farmers are increasing

their acreage in this crop, as it is very profitable. Unusual facilities for transporting crops to the large markets are afforded by two lines of transcontinental railroads, the Northern Pacific and the Chicago, Burlington and Quincy, which traverse this tract. No farm is more than three miles from a shipping point. There are eight new towns on this project at intervals of about 5 miles along the two lines of railroad, and town lots are now offered for sale by the government at reasonable prices.

SUN RIVER PROJECT, MONTANA

Not far from the thriving city of Great Falls, Montana, the first unit of the Sun River project will be opened to settlers on May 7. This project, when completed, will be one of the largest undertaken by the government, irrigating nearly 256,000 acres, or considerably more than the cultivated acreage of Rhode Island. An interesting feature in connection with this project is the proposition of the engineers to augment the water supply by taking water from the streams now flowing into the Pacific Ocean through a gap in the continental divide to a watershed which drains into the Atlantic Ocean. The Sun River Valley proper is about 70 miles long and from 1 to 5 miles wide. The unit to be opened in May is the abandoned Fort Shaw Military Reservation, which contains about 200 80-acre farms.

On this project the rural settlement plan of the Reclamation Service will be carried out, and there will be a village about every six miles. The soil is a warm, sandy loam covered with buffalo grass, gramma, and wheat grass. All the crops which can be grown in the northern countries can be raised in this section. The principal crops will be largely alfalfa, sugar-beets, and potatoes.

MILK RIVER PROJECT, MONTANA

In northern Montana the Milk River project, by reason of the international character of the streams to be diverted, has attracted a great deal of attention. The irrigable area in the valley of Milk River is greater than the water supply, and the engineers propose to store water now flowing into Hudson Bay to augment the insufficient flow of Milk River, a tributary of the Missouri. Nearly 250,000 acres are involved in this project. The valley has a soil of sandy loam well adapted to raising all the products of the north temperate zone. The construction of the necessary dams and canals will require several years. Milk River Valley is tributary to the Great Northern Railroad.

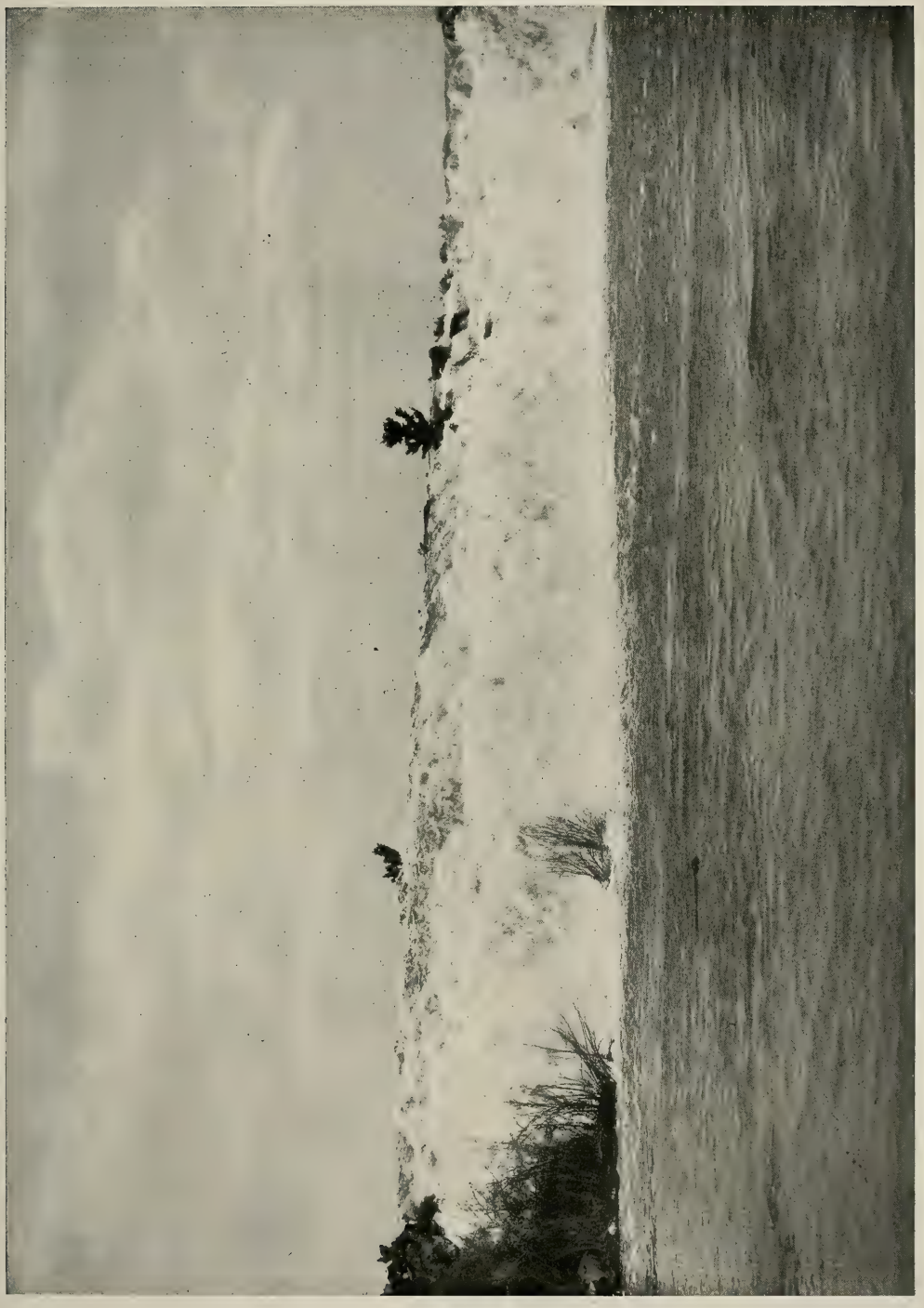
SHOSHONE PROJECT, WYOMING

On the northern border of Wyoming, in a region of exceedingly rough country, the government is building the highest masonry dam in the world. This structure, which will rise 310 feet above its foundation, blocks a very narrow gorge. It will be 108 feet thick on the bottom and only 175 feet long on top. We might get a better conception of the enormous height of this dam if we compared it with the height of some familiar building. Take, for instance, the Flatiron building, in New York. Placed side by side, the Shoshone dam would rise one story higher.

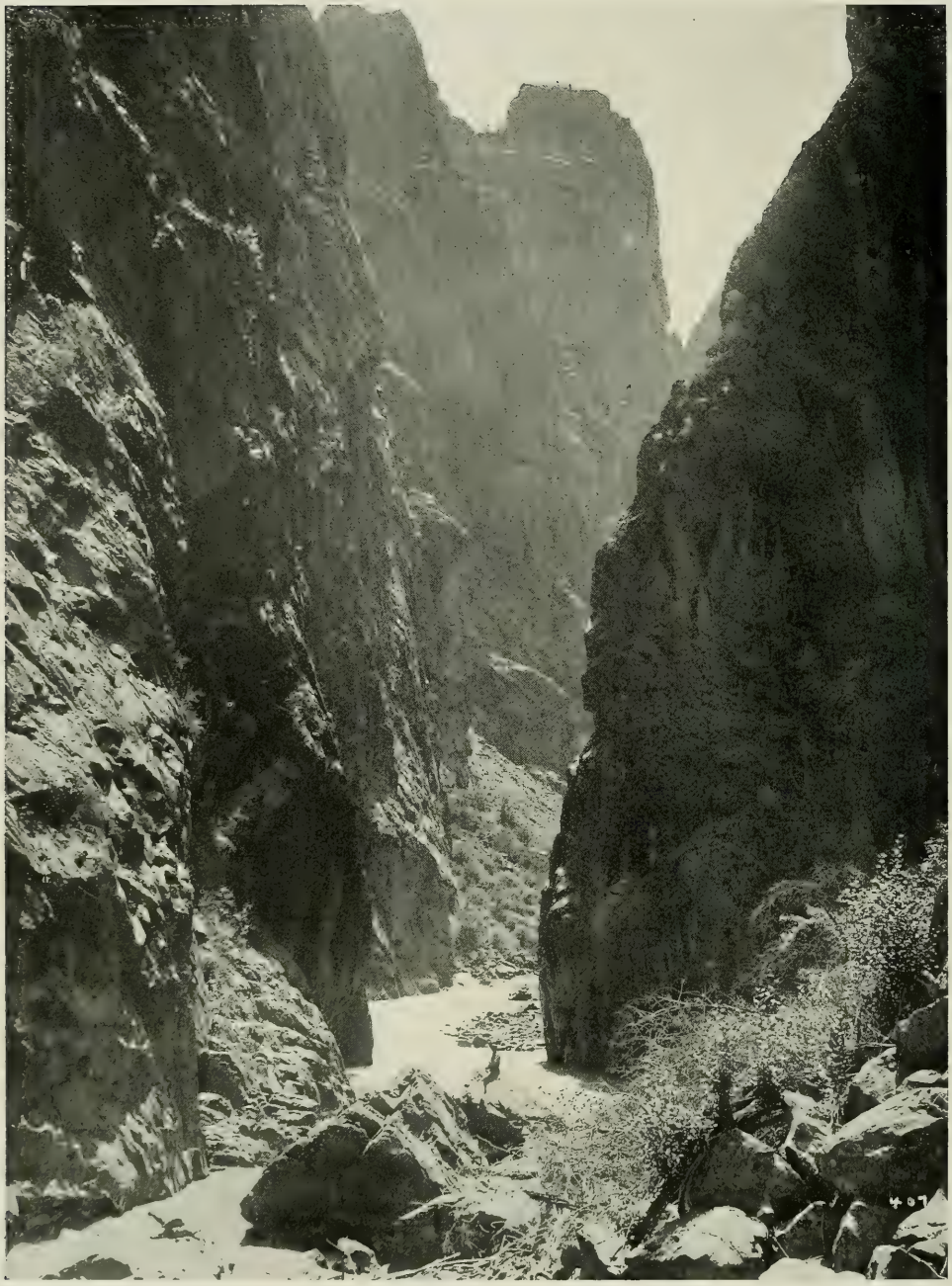
The work here is difficult and dangerous. Workmen are lowered into the canyon, the walls of which are hundreds of feet high, and, with ropes about their bodies as they work, put in the drill holes for blasting. Before work could be begun on this structure it was necessary for the Reclamation Service to build a road 8 miles in length to get into the canyon. This road was cut for the most of the distance from the solid walls of rock. The dam will create behind it the largest lake in the State of Wyoming, with a superficial area of 10 square miles and an average depth of 70 feet.

Twelve miles below the Shoshone dam a diversion dam is being built in the river which will turn the stream into a tunnel 3¼ miles in length, connected at the other end by a large canal which carries the water out upon 100,000 acres of choice land. A portion of this area will be watered next spring, and is opened to settlement at this time to *bona fide* citi-

CATTLE KNEE DEEP IN ALFALFA: GARDEN CITY PROJECT, KANSAS (SEE PAGE 257)



BLANCHARD FALLS: MINIDOKA PROJECT, IDAHO (SEE PAGE 263)



IN GUNNISON CANYON: UNCOMPAHGRÉ PROJECT, COLORADO (SEE PAGE 263)

zens of the United States. The irrigable lands are reached by the Chicago, Burlington and Quincy Railway.

NORTH PLATTE PROJECT

In southern Wyoming another large work is well under way. The structure known as the Pathfinder dam is being erected in a narrow canyon of the North Platte River at the identical point where General John C. Fremont, the noted explorer, nearly lost his life while attempting to get through in a boat. This structure will be 215 feet high and will create an enormous reservoir with a storage capacity of 1,025,000 acre-feet, or enough water to cover 1,025,000 acres a foot deep. To better appreciate the quantity of water in this reservoir it should be understood that it is sufficiently capacious to hold back the greatest flood ever known in this turbulent stream. In connection with this dam and reservoir the government has built a large canal 95 miles in length to carry the waters onto lands in Wyoming and Nebraska. Owing to the rough country along the canal route, several large concrete viaducts were constructed and for several miles the canal is lined with cement. The irrigable lands are tributary to the Chicago and Northwestern, Chicago, Burlington and Quincy, and the Union Pacific Railway systems.

BELLE FOURCHE PROJECT, SOUTH DAKOTA

Northeast of the Black Hills, in South Dakota, lies the beautiful valley of the Belle Fourche, embracing several hundred thousand acres of exceedingly fertile land. In this valley the Reclamation Service has nearly completed a great work for the irrigation of 100,000 acres.

By means of a concrete diversion dam the entire flow of the Belle Fourche River will be diverted into an inlet canal 6½ miles in length and large enough to carry the minimum flow of the Potomac River at Point of Rocks. This canal turns the water into a natural depression between two hills. This depression is blocked by one of the largest earthen embankments in the world, a structure more than a mile in length and 115 feet in maximum height. The reservoir thus formed has a storage capacity of 203,770 acre-feet, and forms the largest lake in the State of South Dakota.

Home-seekers have been pouring into this valley for the last two years, and nearly all of the public land is now occupied by settlers who are awaiting the completion of the works. The towns in the valleys have more than doubled in population since the work began. There are opportunities for home-seekers to secure land from private owners whose holdings are in excess of the requirements of the Reclamation Act. The principal markets for the products of this valley are the mining towns in the Black Hills, the Twin Cities, also Omaha and Chicago, which are reached by the Chicago and Northwestern and Chicago, Burlington and Quincy railways. Back of the irrigated country is a vast area of public lands which is available for ranging cattle and sheep. The principal products will be alfalfa, cereals, vegetables, and the hardy fruits.

GARDEN CITY PROJECT, KANSAS

In southwestern Kansas the Garden City Project, although embracing only 8,000 acres, is relatively one of the important government works in the Plains region. Owing to the numerous novel features involved in its construction, the project has attracted much attention. It is believed that the successful initiation of this system will encourage private capital to take up work in other parts of the Arkansas Valley and elsewhere on the Great Plains.

As the Arkansas River could not be depended upon to supply water to gravity canals, the engineers devised a scheme to utilize the underflow. About 300 wells were sunk, the combined length of which exceeds 4 miles. These wells are in groups of 12 each and vary from 12 to 15 inches in diameter. Each group will be operated by its own pumping plant, and all pumps will be operated by electricity generated in a central power station. The water from the wells will be

lifted into a concrete-lined conduit, which discharges into the main canal. During the irrigation season this leviathan pumping plant will lift 30,000 acre-feet, or about 11,000,000,000 gallons.

The value of land in this part of Kansas, in its natural condition, varies from $5 to $15 per acre. When reclaimed by irrigation it is easily worth from $100 to $150 per acre. The principal crops are sugar-beets and alfalfa, considerable quantities of which are already under cultivation. Apples and melons are especially profitable crops when irrigated. This section is tributary to the Santa Fé system.

NEW MEXICO PROJECTS

There are three national projects in the Territory of New Mexico, two of which, the Carlsbad and Hondo, are practically completed and will water 30,000 acres this season.

The Hondo Project provides for diversion and storage of the flood waters from Hondo River, a tributary of the Pecos, and will reclaim 10,000 acres of land in the vicinity of Roswell. No public land is watered by this project, but lands in private ownership are for sale at reasonable prices.

The Carlsbad Project is located on the Pecos River, in southeastern New Mexico, on the Santa Fé system. The entire acreage is in private ownership, but several thousand acres are included in excess holdings and must be disposed of to farmers who will purchase water-rights under the government system. The price of land varies from $20 to $60 per acre.

The climate is mild. In winter the temperature during the day is seldom below freezing. The summer temperature seldom goes above 100 degrees and the nights are always pleasant.

The soil is a light, sandy alluvium and very fertile. The chief crops in the valley are peaches, pears, apples, cherries, small fruits, alfalfa, cotton, sweet potatoes, celery, and garden truck. Five crops of alfalfa are grown each year, yielding a total of 5 to 8 tons per acre. Fruits, cotton, and alfalfa are the most profitable crops, and fodder-corn, cane, and milo-maize yield good forage crops. Stock-raising is profitable, owing to extensive range lands to the east and west.

There is a good market for horses and mules at Carlsbad, and hay is always in demand here and at other points in the valley. Cotton, after being ginned, is shipped to Houston or Galveston. Kansas City, Wichita, El Paso, Fort Worth, etc., afford markets for all other excess supplies. The Pecos Valley is a good winter feeding center for range stock.

Cotton gins, cotton-seed oil and oil-cake factories, and canneries with adjunct machinery for the manufacure of denatured alcohol are needed in the valley. There are at present water-power plants at Carlsbad and at a point five miles below, and there is room for additional plants further down stream.

The Rio Grande Project involves the construction of a storage dam 255 feet high, opposite Eagle, New Mexico, across the Rio Grande, which will form a reservoir 175 feet deep at its lower end and 40 miles long, with a storage capacity of 2,000,000 acre-feet, for the irrigation of 180,000 acres of land in New Mexico, Texas, and Mexico.

The Leasburg Diversion, which is a part of the Rio Grande project, consists of a low, 600-foot concrete diversion dam, with pier, embankment, and sluice-gates, head-wier and head-gates. In connection with the diversion dam 6 miles of full-sized canal were constructed to connect with the old Las Cruces Canal. Construction was begun November 27, 1906, and water will be supplied to 10,000 acres this summer. The valley has splendid railroad facilities and contains many thriving cities and towns, of which El Paso, Texas, is the metropolis.

OUR INLAND EMPIRE

Beyond the Rocky Mountains lies the true desert, a land of mysterious silence; a land of potential greatness, awaiting the magic kiss of canal-borne water to wake to teeming fecundity. It is often called the inland empire.

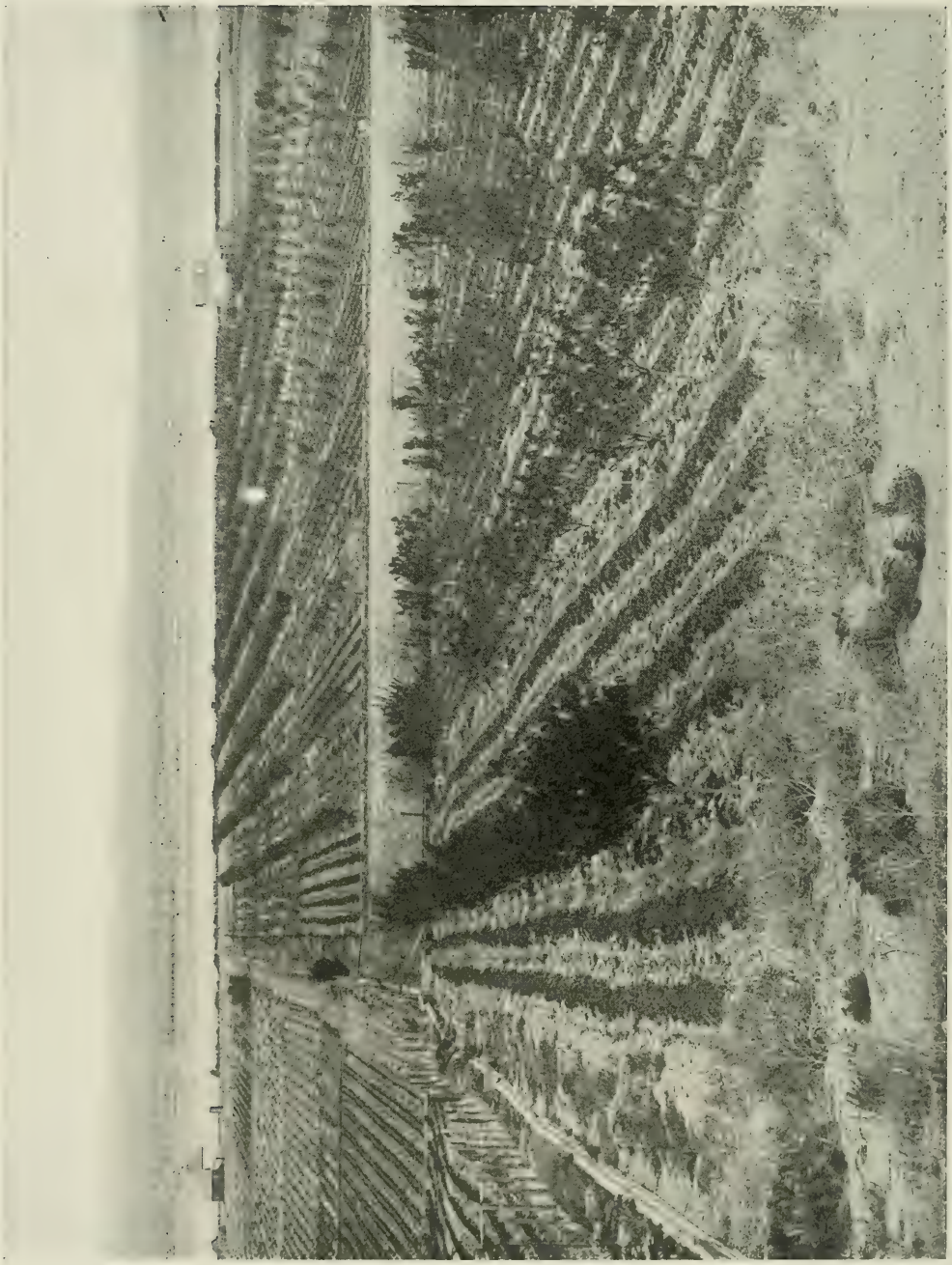
RAISING HOGS IN THE KLAMATH VALLEY: KLAMATH PROJECT, OREGON (SEE PAGE 267)

In many parts of it Nature has placed in juxtaposition all the natural elements except rainfall required for a fruitful, prosperous country. Its climate is healthful and salubrious; its valleys and plains possess a soil of inexhaustible fertility, and from the forest-clad mountains, with summits in regions of perpetual snow, countless streams rush downward to both oceans or flow into desert sinks and there evaporate. How to overcome the absence of moisture from the clouds and thus bring the region to its proper state of development is today a problem of paramount importance. Its successful solution will provide a safety valve against the impending dangers of congestion in the cities of the East.

The future of our desert empire is, in a measure, predicated by the marvelous achievements of the pioneers. With a courage born of conviction and fostered by the hope which dwells perennial in the breast of the Argonaut of the sagebrush country, they have, within the past few years, wrested from a region long regarded as absolutely worthless a crop-producing, home-supporting area of inexhaustible fertility, greater in extent than the cultivated lands in Massachusetts, Connecticut, Delaware, New Hampshire, New Jersey, Rhode Island, and Vermont, and capable of supporting a larger rural population. More than $120,000,000 have been expended in irrigation works in the West, and 70,000 miles of canals now carry the life-giving waters to 10,000,000 acres, which each year produce crops valued at more than $250,000,000.

As good American citizens, we owe it to ourselves to extend our knowledge of this splendid country. There is an inspiration in the breadth and vastness of this sleeping empire in the West, and a sublimity in the lofty mountains whose summits are clothed in perpetual snow. One breathes optimism and grows in mental breadth and strength in contemplating scenery which has no counterpart in the world.

The economic value of national irri-



VIEW SHOWING CULTIVATED LAND IN THE LOWER VALLEY OF THE YAKIMA RIVER, WASHINGTON

PEAR TREE IN ORCHARD OF J. H. FORMAN AND PICTURE OF OWNER; NEAR PARKER, WASHINGTON, UNDER SUNNYSIDE CANAL

YAKIMA MAIDEN PICKING HOPS: YAKIMA PROJECT, WASHINGTON

gation cannot be measured in dollars and cents. The desert made habitable offers the boon of health to him who erects his dwelling upon it. You cannot fix the possibilities of this land of silence and sunshine. We know that the influence of its far-flung horizons and its true perspective are potential in character-molding and building. Instead of the dead level of mediocrity, which prevails in modern city life, the desert offers the uplift of unmeasured distances, the perpetual sunshine, and the individual home, with the broader freedom of action which comes with life in the open. There is a constant inspiration to industry, a stimulation to endeavor, in the superabundant life which springs from the bosom of the desert when water is applied. The transformation which follows irrigation is so remarkable that we are prone to believe Aladdin and his lamp have really appeared.

MINIDOKA PROJECT, IDAHO

Three years ago last July I camped for the night on the banks of the Snake River, in southern Idaho. Save for our campfire there was no sign of human habitation within 30 miles, only a vast sage-brush plain, rimmed on every side by the horizon. It was a night to remember. Over us spread a star-gemmed canopy; around us the embers of a sage-brush fire shed their glow. In the near distance the doleful wailing of the skulking coyote sent a chilly feeling up and down the spine.

A weather-tanned engineer in faded khaki sitting beside me drew rough plans in the sand, and I listened, interested, but doubting, while he pictured the future of this dusty plain. That engineer's plans found favor in Washington, and in two months actual work of construction began. An army of men came upon the field and straightway took that river and blocked it with a wonderful dam; then they led it into 130 miles of great canals and 190 miles of ditches, and spread it over 85,000 acres of land.

Attracted by the signs of industry, settlers poured in and every 40 or 80 acres of that vast area was taken up. Houses began to dot the plain and a railroad 100 miles long, a branch of the Oregon Short Line, was built through the center of the tract. Three new towns sprang up as if by magic. On the site of our camp a school-house stands which opened last year with 74 pupils. Today 1,400 families are living on farms and a thousand people are living in towns where a trifle over three years ago the eye met nothing but dust and desolation.

The Minidoka Project furnishes indubitable evidence that a better investment was never made by a government since the world began than national irrigation. President Roosevelt said, "No part of this nation can be benefited without a reflex benefit to the other part." In this one project we find the proof of this statement, for the 1,400 families who are at work in that desert valley in Idaho today are furnishing a market for endless quantities of manufactured articles, the bulk of which are Eastern made.

PAYETTE-BOISE PROJECT, IDAHO

The Payette-Boise Project will reclaim 372,000 acres of land in the fertile valleys of the Payette, Boise, and Snake rivers, in southwestern Idaho, which are tributary to the Oregon Short Line, the Boise, Nampa and Owyhee, and the Idaho Northern railroads. The lands are in Ada, Canyon, and Owyhee counties, and are generally smooth, with gentle slopes. Construction work is well under way and many settlers have already taken up their homesteads.

The valleys are the best populated in the state. The citizens came largely from the middle West and are prosperous and progressive. With superior market and transportation facilities, with soil and climate adapted to diversified and intensive farming, this section is destined to become one of the most densely populated agricultural regions in the Northwest.

UNCOMPAHGRE PROJECT, COLORADO

In southwestern Colorado the most spectacular project of the government is nearing completion. In this region two

streams, the Uncompahgre and the Gunnison, flow in nearly parallel courses about 10 miles apart and separated by a mountain range 2,000 feet high. The Uncompahgre flows through a broad valley containing several hundred thousand acres of fertile land. Its volume is sufficient for the irrigation of only a small part of the irrigable area. On the other hand, the Gunnison River, a stream of much larger discharge, flows in a profound canyon and in its valley there is no considerable area of land to be watered. To augment the insufficient flow of the first stream the greatest underground waterway in the world is being constructed—a tunnel 6 miles long, with a cross-section 10½ by 12 feet, under a mountain 2,000 feet. It will bring into the valley a part of the waters of the Gunnison River. The history of this project is replete with danger, daring, and heroism, and the men who initiated this work and those who have carried it forward furnish proof enough that all of Uncle Sam's heroes do not wear uniforms.

The topographers who followed to complete the original survey encountered almost unheard of trials. Many times it was necessary to lower them by ropes hundreds of feet into the canyon. The location for the tunnel was determined at a point where the canyon was more than a half mile deep. It was necessary then to construct a road into this frightful gorge, a remarkable road, 16 miles long, with grades out of the canyon 23 per cent in places. Heavy machinery was brought in and a power plant installed.

The difficulties encountered have tried the heart of those engaged upon the work. Gas, cave-ins, and subterranean springs have all interposed obstacles requiring the utmost care in the prosecution of the work. At frequent intervals heavy flows of water have been encountered. This has required the installation of complete pumping facilities. At the present time pumps are discharging about 250,000 gallons per 24-hour day, and the quantity pumped has been as high as 750,000 gallons during the same period. More than four miles of the tunnel have been excavated to date. While the tunnel work was going on many miles of canals were dug, some of which were in exceedingly unfavorable country and necessitated cement lining.

Irrigation from this project will begin in 1909, and 140,000 acres of land, much of which is adapted to the growing of deciduous fruits, will be ready for settlement. The Denver and Rio Grande Railway traverses this section.

STRAWBERRY VALLEY PROJECT, UTAH

This project provides for the irrigation of about 60,000 acres of land in central Utah, situated from 5 to 15 miles south of Provo, and on the eastern shore of Utah Lake. Water supply will be received from a storage reservoir to be built on Strawberry River, about 30 miles east of the irrigable area. By means of a tunnel 3½ miles long stored waters will be carried under the divide and emptied into Spanish Fork, from which a canal from 18 to 20 miles long will convey them to the irrigable area. The lands have a mean elevation of 4,500 feet.

YAKIMA VALLEY PROJECTS, WASHINGTON

On the eastern side of the Cascades, in Washington, are a succession of valleys in the drainage of the Yakima River. Comprehensive plans have been worked out by the Reclamation Service and construction is well under way for the reclamation of the largest project yet undertaken. The irrigable area is nearly a half million acres and the cost will probably exceed $15,000,000. The work is being taken up in divisions, each involving the irrigation of specified areas.

Storage is provided by erecting dams at the outlets of several mountain lakes, the capacity of which will total 804,000 acre-feet. On the Sunnyside Unit the government purchased a large canal, enlarged it and rebuilt the diversion dam in the Yakima. Last year this system supplied 40,000 acres, and a crop census showed that the yields amounted to $2,000,000 or $50 per acre.

No section of the United States gives

more generous returns for the labor employed than the Yakima Valley. I have never dared to tell Easterners what I really know to be true about the crop yields. Some of the views will give you an idea of the intensive farming practiced there.

Among the wealth producers the apple orchards take a high rank. Full-bearing orchards produce frequently from $300 to $1,200 per acre annually. It can be stated that $300 is less than the average for all well-kept orchards. The fruit grown here is attractive, sound, and ships well. Its market is New York and Europe, and the commission men are so eager for the crop that it is often contracted for in advance. Orchard lands sell for from $300 to $2,000 per acre, depending on location and condition of trees. The pear crop is very profitable, and peaches and grapes do well. A large area is in hops, and the yields here are so generous that I am told Yakima is driving New York out of the hop-growing business.

The Yakima Indians find employment in the hop fields during the picking season, and usually camp just outside the fields. Alfalfa is another money-maker, producing from 6 to 8 tons per acre, worth on an average of $5 per ton in the stack. In 1907 the Yakima Valley shipped fruit to the value of $1,125,000. Its hay crop was worth $2,000,000; potatoes, $250,000; onions, $50,000, and hops, $200,000, a total of farm products of $3,625,000. Sixty-five thousand cattle and 20,000 sheep were ranged and fed in this valley in 1907, valued at about $2,000,000.

Ten and 20 acre farms are common in this valley, and this has brought about compact rural settlements along the irrigation canals. In turn there has followed a gradual improvement in social conditions, with the elimination of the isolation of farm life, which has in itself proven such an important factor in swinging the pendulum of population from the farm to the town. The luxuries of town life are enjoyed in a measure by the farmer, who at the same time lives a life of freedom in the open.

When the works on this section are completed the Yakima Valley will become one of the show places of the country. Over a greater portion of the irrigable area the farms will not exceed 20 acres in area, and we may look for a population of 250,000 in this favored region in the not distant future. Fully developed, the taxable property should have a value of not less than $70,000,000, making it one of the richest agricultural districts in the world.

The area which can be reclaimed is nearly double that which is now irrigated in Southern California. A splendid part of the life in the Yakima Valley is that one can live out of doors so much of the year. The same share of clear skies and dry air that makes Southern California so attractive is enjoyed in Washington. The valley is on the main line of the Northern Pacific and the new line of the Chicago, Milwaukee and St. Paul Railway now building.

OKANOGAN PROJECT, WASHINGTON

The Okanogan country lies about half in British Columbia and half in the United States. Owing to its remarkable climate this valley has been called the California of the Northwest. The Reclamation Service has nearly completed an interesting engineering work here to reclaim 8,000 acres. The land is very fertile and, owing to the exceptionally favorable climate, a wide variety of products, many of which are high priced, are produced. Frost has never injured the fruit in the valley in which this work is located, and there has never been a failure with apples, peaches, plums, prunes, apricots, pears, cherries, nectarines, grapes, and all the varieties of small berries grown in the United States. The nearest railway town is Wenatchee, on the Great Northern, from which place steamboats ply daily up the Columbia to Brewster, and thence by stage 28 miles to Okanogan, a town of 400 inhabitants.

UMATILLA PROJECT, OREGON

The Umatilla project, in northeastern Oregon, when compared in area with many others now under construction,

ONE ACRE OF CONCORD GRAPES IN ORCHARD OF WILLIAM SQUIRE, NEAR ZILLAH, WASHINGTON, UNDER SUNNYSIDE CANAL

might be regarded as one of the lesser works, but when studied as to its possible future development it easily takes a prominent place among the most favorable and attractive agricultural regions in the West.

No expert who has investigated this wonderful land of sunshine has yet dared to place a limit upon its agricultural possibilities. Nature here gives the maximum return for the minimum of labor.

The irrigable lands lie in rolling benches along the Columbia and between it and the Umatilla. The diversity of crops, many of which are high priced, made possible by the exceptionally favorable conditions of soil and climate, predicate small farms intensively cultivated, providing homes for an intelligent and prosperous husbandry. The promise of a compact community of scientific agriculturists in this valley is certain of fulfillment in the near future. From the nature of the crops and the character of the people who will grow them it requires no particular gift of prophecy to predict the establishment in this valley of a rural settlement which will be likened unto many of those nearly ideal communities which have grown up under methods of intensive irrigation in Southern California.

The water supply is the flood flow of the Umatilla, which is stored in a reservoir created by constructing an earthen embankment nearly 100 feet in height and one-half mile long. Owing to the exceedingly porous character of the soil, many of the canals are lined with cement. The line of the Oregon Railroad and Navigation Company passes through the irrigated area.

TRUCKEE-CARSON PROJECT, NEVADA

On the western border of the Great Interior Basin in the bed of ancient Lake Lahontan, in Nevada, an important work is now completed to irrigate 160,000 acres. This is the dryest part of the United States except Death Valley, and was called "Forty Mile Desert" by the gold hunters who crossed it en route to California. The old overland trail can still be traced across the desert, and we come upon many melancholy evidences of desert tragedies, enacted in the early fifties. In excavating canals our great shovels have encountered the bones of men and horses who perished of thirst. We know now that much of their suffering was unnecessary. There is plenty of good water not far below the surface of the sands. In fact, the grave-diggers, if they had gone a few feet deeper, would have been able to satisfy their own thirst. The irrigation works in this valley in a way have changed physical geography. The Truckee River is lifted from its bed by a huge dam 30 feet high, which turns the waters into a broad and deep canal 31 miles long and lined with cement. Truckee River is now flowing into Carson River. Another dam in Carson River diverts the combined flow of both streams upon the desert, which has already begun to blossom. Eight hundred farms are now awaiting settlers here. The terms are easy and the market for farm products is the best in the West. You reach this valley on the Southern Pacific Railway.

KLAMATH PROJECT, OREGON-CALIFORNIA

The Klamath Project contemplates the reclamation of about 190,000 acres of land situated in Klamath county, Oregon, and Modoc and Siskiyou counties, California. The plans involve, in addition to the irrigation of the valley lands, the reclamation by drainage and future irrigation of a portion of the Lower Klamath and Tule lakes, lands which are now either swamp or lake bottoms. Practically all the uplands, which include the greater part of the project, are held in private ownership, mostly in large holdings, which, under the terms of the Reclamation Act, must be subdivided into tracts of not to exceed 160 acres. The public lands under the project, which include nearly all of the lake and swamp areas, are at present withdrawn from entry. When these lands are restored to entry, homesteaders may file applications for available public lands.

Construction work on the first 9 miles

of the main canal and the laterals thereunder was begun in March, 1906, and completed in 1907. From this canal water will be delivered to from 12,000 to 15,000 acres during the irrigation season of 1908. The lands under the project are of good quality. The principal crops grown are alfalfa, wheat, oats, barley, rye, vegetables, and some deciduous fruits. A few experiments in sugar-beet culture show that it is probable this crop can be successfully grown. The principal town of the valley is Klamath Falls, located on Link River about one mile below the lower end of Upper Klamath Lake. Other towns in the valley are Merrill, situated near Tule Lake, and Bonanza, situated on Lost River, within the so-called "upper project." The California and Northeastern Railway is now under construction to Klamath Falls.

YUMA PROJECT

President Roosevelt is responsible in a measure for the present widespread interest in the delta of the Colorado River, having made it the subject of a special message to Congress last session. This region has been likened unto the wonderful valley of the Nile, which it so greatly resembles in soil, crops, and climate. The world is familiar with the catastrophe which threatened for a time to destroy a very large area in the lower valley, but few people appreciate the almost superhuman engineering feat by which this powerful stream was forced back into its old channel. This was accomplished by the engineers of a great railroad company, which placed at their disposal vast sums of money and almost the entire equipment of the system. Since the river was controlled the government work at Yuma and above has progressed rapidly. The great weir at Laguna is now within 700 feet of closing the river, and during low-water stage this year heroic efforts will be made to complete this structure. The Laguna dam is interesting, as it is the first structure of this kind to be erected in the United States. It is similar to several weirs built by the English engineers in Egypt and India.

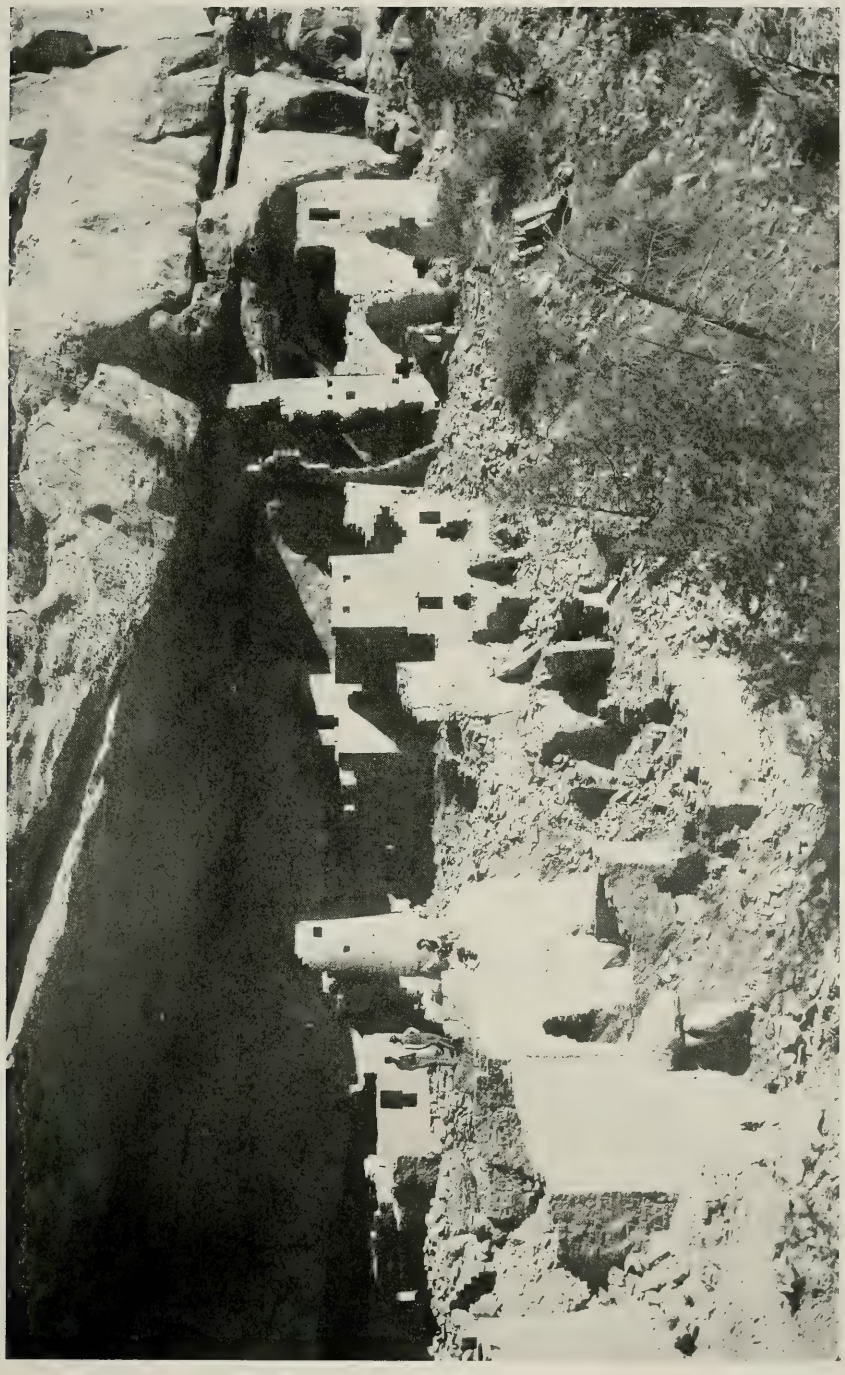
The project contemplates the reclamation of about 100,000 acres in Arizona and California. These lands are without question the most valuable in the country when watered. President Roosevelt, in his message to Congress, said: "The most conservative estimate after full development must place the gross production from this land at not less than $100 per acre per year, every 10 acres of which will support a family when under intensive cultivation. Much of the land will be worth from $500 to $1,500 per acre to individual holders." Yuma, the principal city in this section, is on the Southern Pacific Railway.

A VANISHED RACE

A peculiar interest attaches to our far Southwest, for the reason principally that long before the first word of our Nation's history was inscribed a semi-civilized people dwelt there and cultivated its fertile soil. Impenetrable mystery envelopes the age in which they lived. With four centuries of our own records to scan, supplemented by seven centuries of Moki traditions, the veil of the past thus parted throws no ray of light upon this ancient race. Their wonderful dwellings, perched eyrie-like in the deep canyons, and the long lines of their canals, choked with the wind-swept drift of centuries, give mute and pathetic evidence of their architectural and engineering skill.

Frowning battlements overlooking the desert, crumbling slowly into dust with the weight of ages, breathe of war and romance in an age forgotten. These monster structures, containing millions of pieces of stone, and the miles of canals which embraced whole valleys, tell of a thrifty home-loving husbandry. In these voiceless and vacant ruins we may almost read the story of Egypt of the scriptures, of another people toiling under the desert's brazen skies, wearily and painfully executing the commands of another Pharaoh.

What Fate overtook them we shall never know. Yet among these castled cliffs we know that men have lived and died, and youths and maidens have re-



REMAINS OF A VANISHED RACE (SEE PAGE 268)

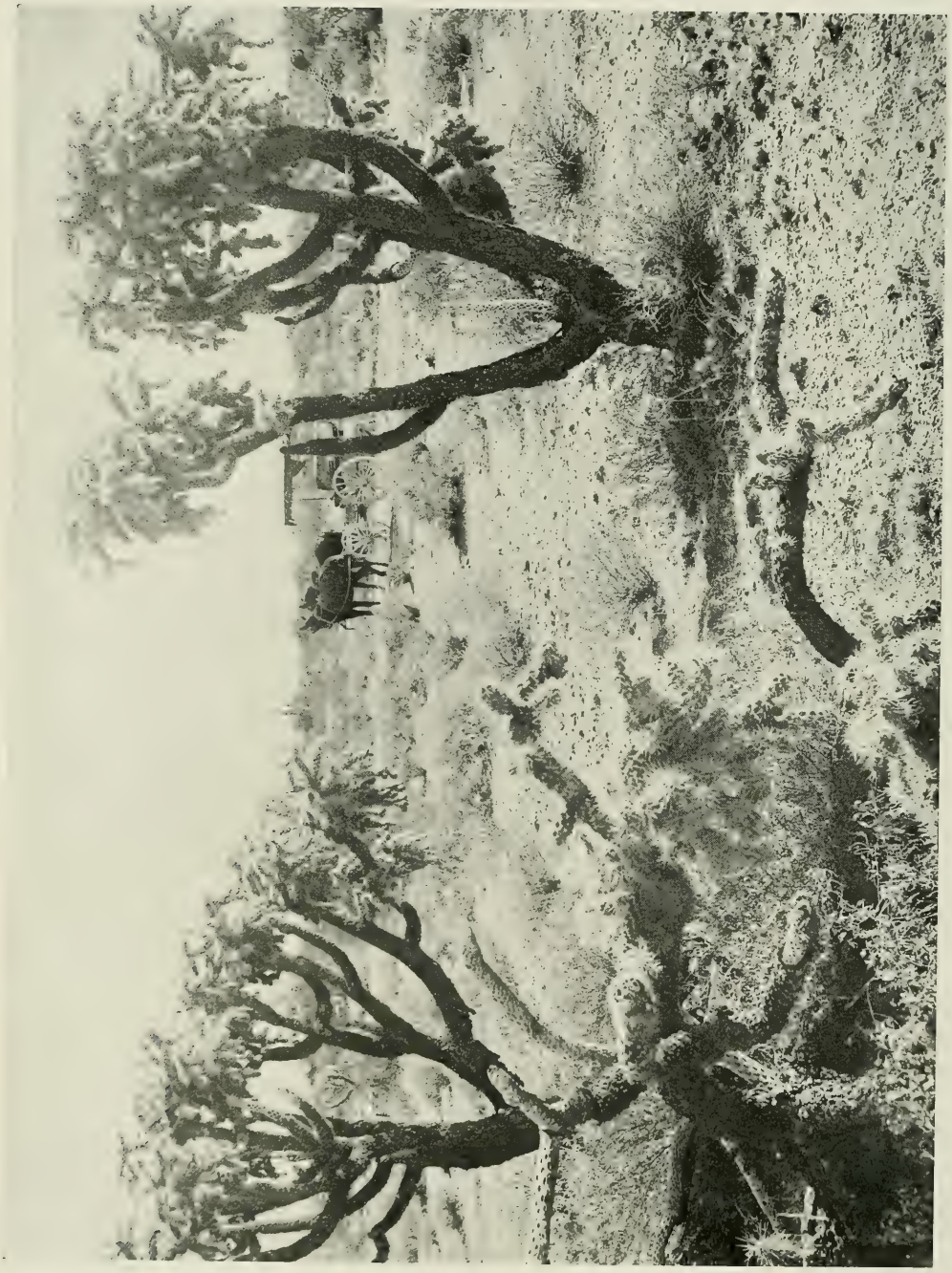
THE CAPITOL GROUNDS FROM THE SOUTHWEST CORNER OF THE CAPITOL BUILDING, PHŒNIX, ARIZONA, SHOWING VARIETY OF VEGETATION

BALED HAY STORAGE BUILDING AT THE CHANDLER RANCH, 6 MILES SOUTH OF MESA, ARIZONA. WATER IS SUPPLIED FOR THE IRRIGATION OF THIS HAY BY PUMPING PLANTS: SALT RIVER PROJECT, ARIZONA

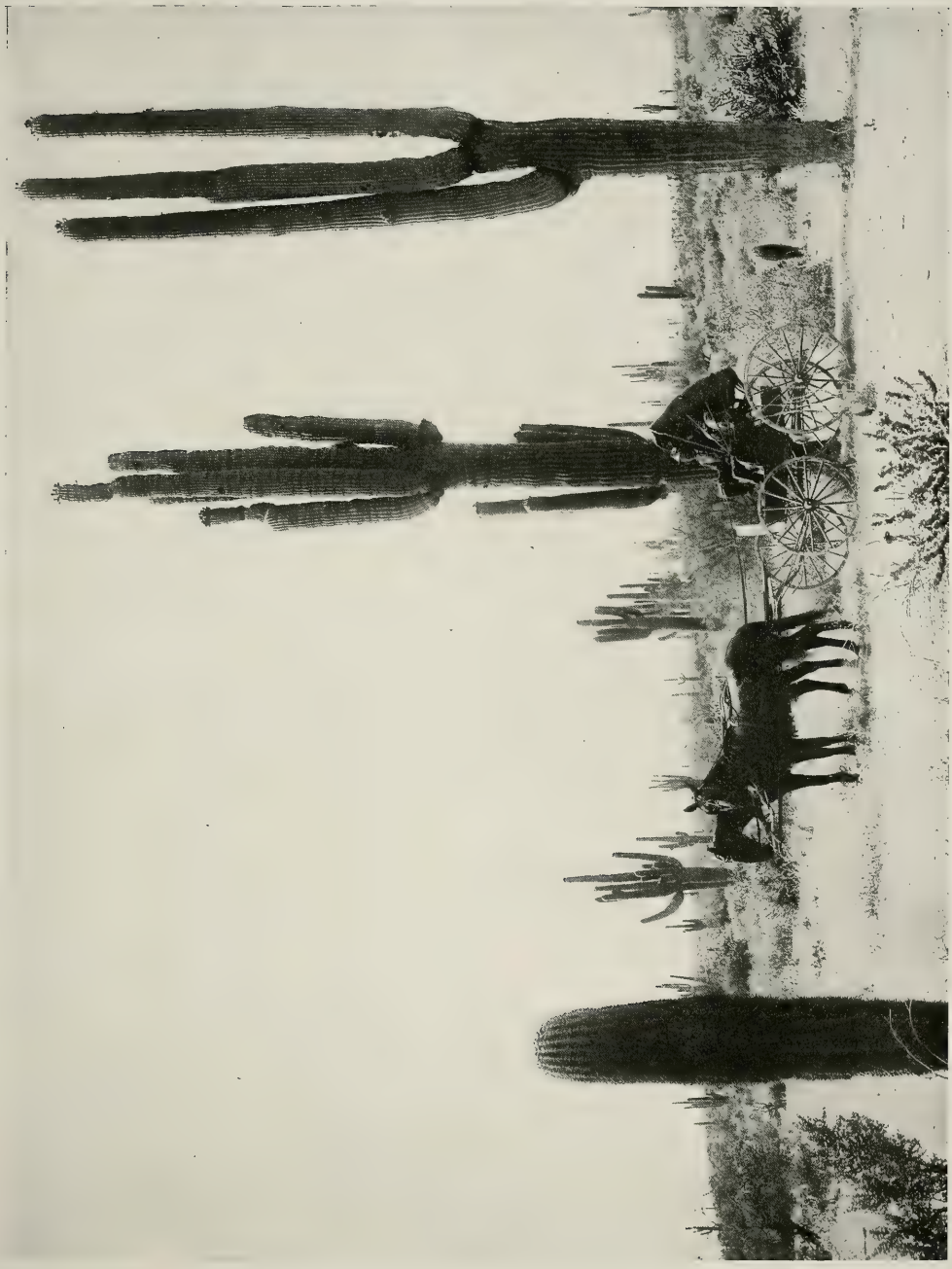
peated, o'er and o'er, the old, sweet story. We confess to a feeling of sadness as we view these structures erected in an age unknown—structures revealing order and intelligence, craftsmanship and patience, and rivalling in some degree the work of modern engineers. The Cheltro Palace is 449 feet long, 250 feet wide, and 4 stories high. Along three sides of it extends a wall 950 feet long and 40 feet in height. The masonry work in this building and wall contained more than 30,000,000 pieces of stone. All had to be quarried, then carried up steep ladders in baskets on the backs of men before being placed in position. Considering the primitive stone implements used and the magnitude of this structure, the time and labor required to construct this building make it the most famous and stupendous work of our country.

SALT RIVER PROJECT, ARIZONA

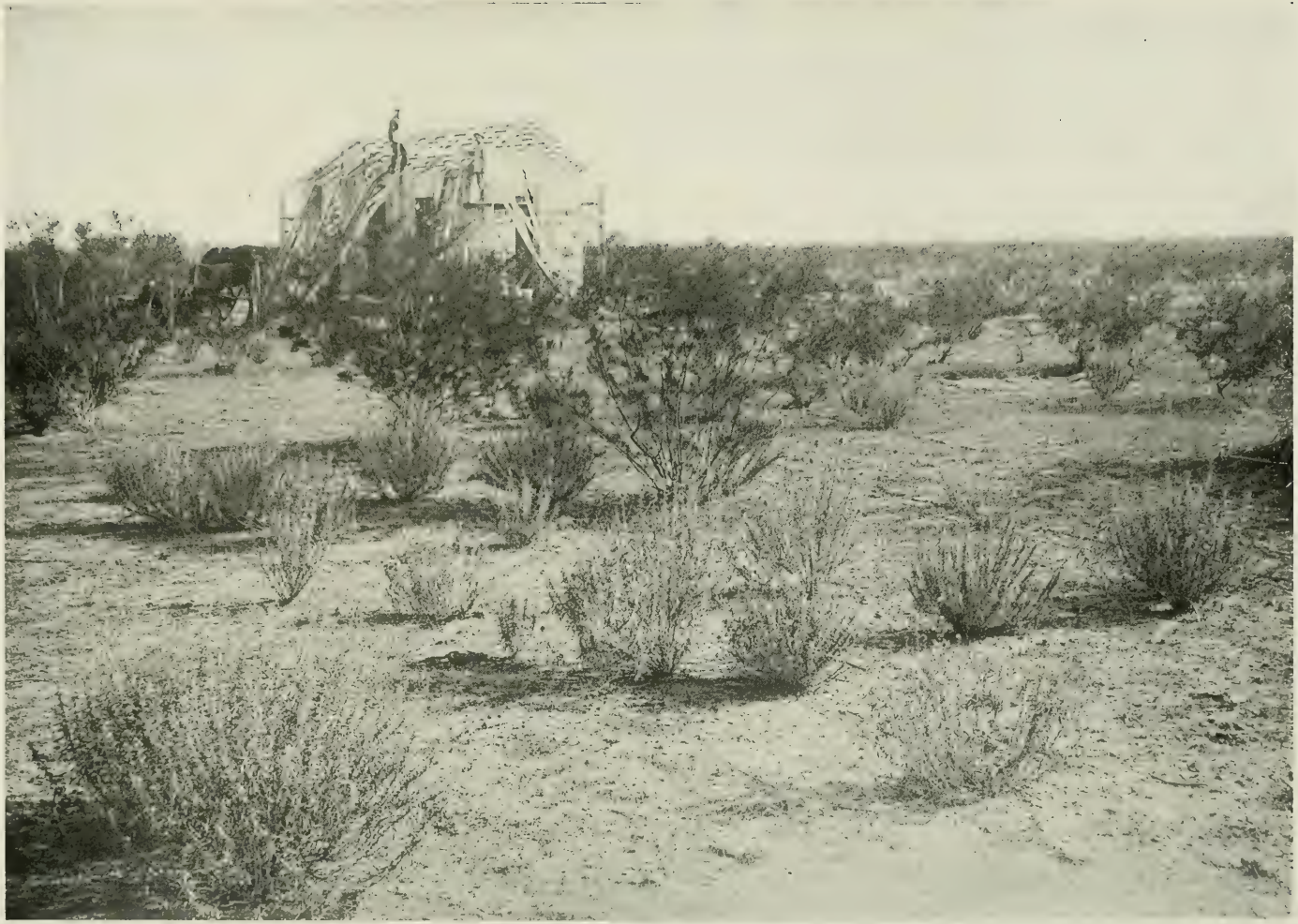
Let us in fancy visit this land of mystery, of lost races and hoary ruins, a land whose civilization was old perhaps when Cæsar sat upon his throne. Starting from the charming city of Phœnix, in the heart of Salt River Valley, let us take a journey to the wonderful engineering works of this project. Leaving Phœnix by train, the Santa Fé or Southern Pacific railways, it is only a short ride to Tempe, where we may profitably pause a moment or two to get a broad view of the valley from the summit of the high butte just at the edge of the town. We note a peculiarity here as we gaze upon the cultivated fields. There are no farmhouses on the farms. Here we find a return to the communal system of farm life, which was typical in the days of the cliff-dwellers and later in those of the Pueblo Indians. The farmer lives in town and goes to and from his small farm each day. Here at last the farmer's wife has her innings. She has the society of her neighbors, her children have graded schools; the church and library are at hand. There is no isolation, no



CHOLLA CACTUS ON THE DESERT BETWEEN GOVERNMENT WELLS AND DESERT WELLS, ROOSEVELT ROAD: SALT RIVER PROJECT, ARIZONA (SEE PAGE 277)

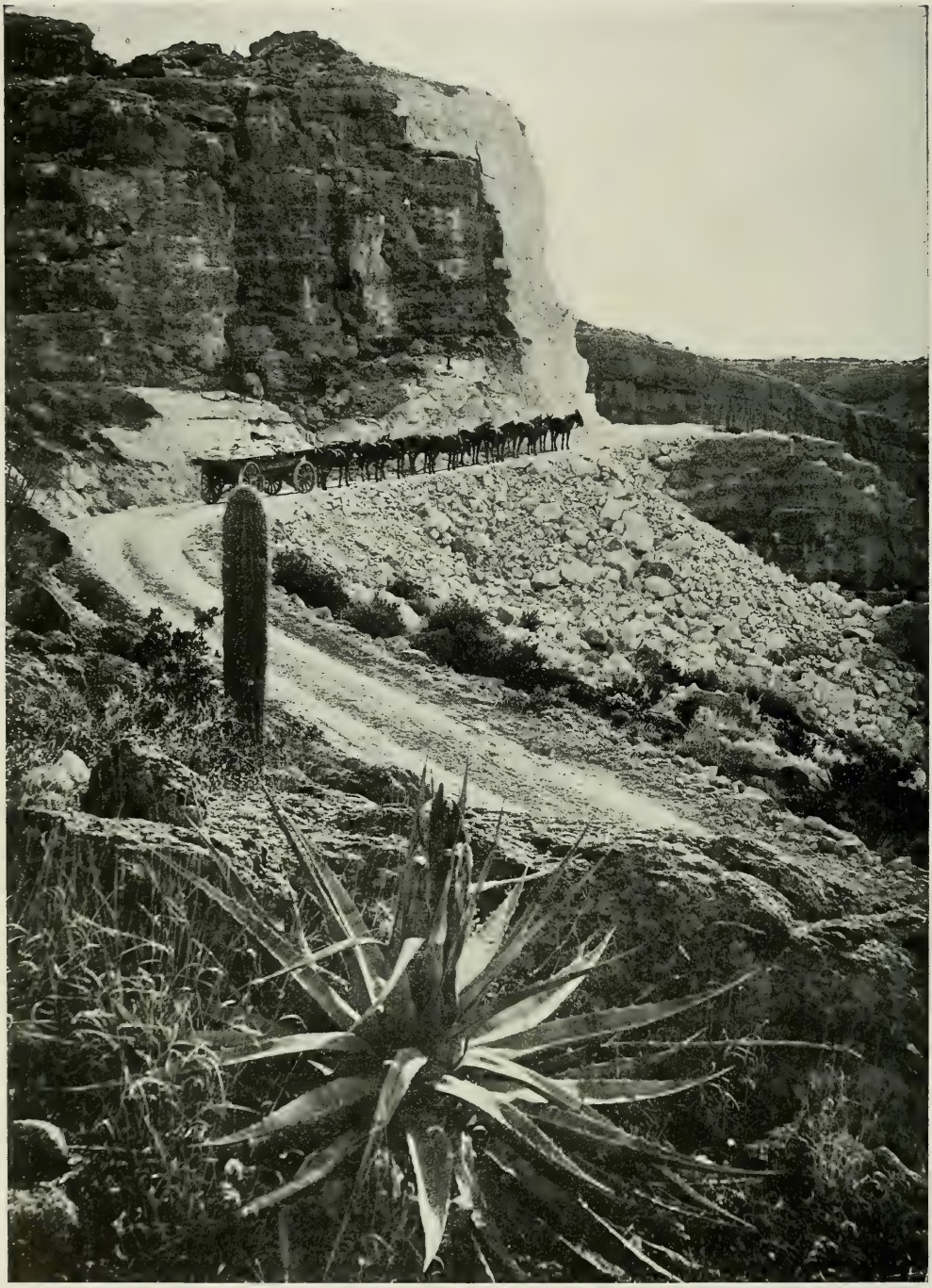


THE GIANT CACTUS ALONG THE ROAD TO GRANITE REEF, ARIZONA: SALT RIVER PROJECT (SEE PAGE 277)



BUILDING HOMES ON THE DESERT IN ANTICIPATION OF THE OPENING OF THE GOVERNMENT WORKS: SALT RIVER PROJECT, ARIZONA

PURE-BLOODED APACHE LABORERS CONSTRUCTING A ROAD THROUGH THE DESERT: SALT RIVER PROJECT, ARIZONA (SEE PAGE 279)



THE TOP OF FISH CREEK HILL, ARIZONA, ON THE MESA AND ROOSEVELT STAGE ROAD, WHICH WAS BUILT BY THE GOVERNMENT: SALT RIVER PROJECT, ARIZONA (SEE PAGE 278)

loneliness. We find under these conditions also that there is no strong tendency on the part of the young men and women to drift to the crowded cities.

From Tempe to Mesa is another short ride by rail through a well-irrigated section. Leaving Mesa in the early morning, when the air is fresh and sweet with the perfume of countless blossoms, we journey for a distance of 8 miles through a region where nature seems to be ever at work producing varied and wonderful forms of vegetation. Just beside our window we note the magnificent date palm, its broad leaves bending in graceful curves and shading an abundance of luscious fruit. We are, indeed, in Egypt, for the date, you remember, was the bread of the desert. If we doubt, a little further along we come upon an olive orchard, and just beyond the almond trees are in bloom, lending fragrance to an atmosphere already perfumed.

We pause to observe a large flock of ostriches wandering over an alfalfa meadow and rub our eyes to be sure we are really in our own country. More familiar to us appear the sleek, fat cattle standing knee deep in the cool alfalfa. This alfalfa is a wonderful crop down here, a veritable farmer's bank account, frequently yielding 12 tons to an acre per year, worth from five to ten dollars per ton.

We linger just a moment to gather a few oranges from the grove beside the road, and as we eat we wonder why such fruit never comes to our tables.

There is such a riot of color about this cottage that we want to stop long enough to ask the housewife how she can get roses to bloom in this wonderful way, but we have a long journey and we only learn that most farmers' wives in this valley, having both time and inclination, delight in beautifying their homes.

"THE LAND THAT GOD FORGOT"

All too quickly we have driven over this flowery, fruitful vale. With a suddenness that is startling we come upon a scene of death and desolation, where everything bears mute evidence of a terrible struggle for life. It is the land some one called "The Land that God Forgot." Everything that grows is covered with a thorn; everything that crawls is deadly. It is a topsy-turvy wonderland. We may not drink of the waters of the desert stream, for they are salty. In this strange region they dig for wood and climb for water, for the water is found in cup-shaped pools in the hills and the wood is the big root of the mesquite.

For 20 miles our road, a government road, stretches across the desert and we begin to feel some of its compelling and pervasive mystery. There is a beauty and charm about it, too, which cannot be described. The distant buttes are glowing richly red in the early morning light and the landscape, some one has said, "suggests a thought of God's original palette whereon he mixed the colors with which he brought forth the glories of a southwest sunset," the opal-tinted morn and the fairest shades of rose and green and yellow.

The desert vegetation is interesting. We come upon the Sahaurra, the giant cactus, the sentinel of the desert, clothed from base to top with thorns, yet bearing delicate and waxen yellow blossoms. Singly and in pairs they grow, some attaining a height of 45 feet. Sometimes we find them in groves. The cliff-dwellers used the heart of this plant for floors in their houses.

Our first stop in the desert is at Desert Wells. It remained for our generation to discover that underneath these burning sands, and at no great depth, is an inexhaustible supply of water, fresh and sweet. At several points along our way the government has put down these wells to supply the needs of the thousands of men and teams constantly crossing the desert.

Rising straight up from the desert is a distant range of mountains. They seem to float above the edge of the level plain, intangible and unreal, yet transcendently beautiful in coloring and contour.

As we enter the mountain country glory after glory of view is presented. Changeful, charming landscape pano-

ramas are unfolded before us. The colors illusive and divinely artistic, shift and change and blend as we gaze in wonder and amazement.

THE MOST WONDERFUL HIGHWAY EVER BUILT BY MAN

We are now entering upon what many travelers have described as the most wonderful highway ever made by man. A great thoroughfare built for 40 miles through the heart of a rugged range of mountains and for the most part literally carved from the living rock. As we go along note the coloring on the rocks, and believe me when I tell you the colors shown are not exaggerated, for it would be impossible for human artist to duplicate, far less to exaggerate, the colors which the Divine Hand has put upon these stones.

I need not tell you that road-building in a country like this was difficult; that fact stares you in the face at every point. When the surveying party reached the top of Fish Creek Hill the engineer called a halt. He wanted time to think; and the problem before him demanded thought. He looked over the cliff into a blind canyon, into which there was not even a foot trail. A thousand feet sheer below him he could discover faintly a tiny stream of water and a few green trees. How was he going to get there with a wagon road over which tons and tons of machinery must be hauled? A hurried reconnaissance disclosed the fact that to go around the canyon meant adding 15 miles to the road. It was not to be thought of. So he decided to blast a road down the face of the steep cliff, and it was done.

It would be simply terrifying to go over the road today but for the fact that the government has built it broad and comfortable, with easy grades and many safe turnouts, for standing here at the edge of the road a pebble slipped from the fingers shoots almost straight down a thousand feet without stopping.

At one point we get a view of the road almost to the blind end of the canyon, and can also see the line of road as it turns back on the other side. Just before we make this turn we cross a pretty little bridge 60 feet above Fish Creek. Down in the bottom of the canyon we find Frazier's Road House, a comfortable little inn, with good beds and a genial landlord. Here we shall spend the night. In this canyon, a miniature grand canyon of the Colorado, we will witness the golden glory of a sunset whose splendor will be impressed forever on our memory. Later we shall sit in the twilight and watch the stars steal forth in skies that seem to touch the walls of the canyon all around us.

The brooding mystery of the scene and the witchery of the hour will sink deeply into our hearts and color our dreams for many nights hereafter.

In the morning early we make our start to climb out of the canyon. Another panorama of mountains, uncanny buttes, steep-walled canyons, and narrow valleys passes before us. Freakishly shaped rocks, grotesque and awe-inspiring, tower above us. What wonder that the Indian viewed the country with superstition and awe!

At places we skirt dark chasms. Here the road has been cut from a rock that is milk white. Here the mountain-top was blasted off and the road built from the river up. Here we have a long swing on the edge of a profound forge, and as we pass along we are thankful indeed that our road is wide and safe.

Higher and higher we climb, every moment catching glimpses of difficult problems in road building worked out successfully. We pass through great cuts, and here and there the road has been built up from below with masonry.

THE ROOSEVELT DAM AND OTHER MARVELS

Our road has brought us to the top of the narrow gorge Salt River has cut through the mountains, and we look down upon one of the world's greatest engineering works in process of construction, the Roosevelt dam. This wonderful structure of sandstone and cement will rise 284 feet above the river. It will be 1,080 feet long on top and 170 feet thick

at the base. Its foundation will cover one acre of ground.

Placed by the side of a 20-story building, it would rise ten feet above it, while its length on top would be more than two city blocks. Across its top will be a roadway 20 feet wide.

By day and by night the dull roar of dynamite breaks the desert stillness, and the canyon walls go crashing down to furnish material for this structure. Great blocks of sandstone weighing ten tons each are swung out on cranes and set in place.

When night comes myriads of electric lights burst forth, weirdly illuminating a busy army of toilers, working gnome-like in a shadowy canyon. It is a wondrous scene, unreal, awesome, and inspiring.

Every stone that is laid in that narrow arch, which is to curb that foaming river, brings nearer and nearer the day when the town of Roosevelt shall vanish beneath an inland sea.

When those massive gates of iron in the big dam, weighing 60,000 pounds, are closed, a rising flood will cover the site of the city 220 feet deep. The people knew it was a doomed city when they built it, but this did not deter them. They built stores and dwellings, a school-house and a church, and brought water from distant mountain springs.

This government work is interesting not only to the engineer, but also to the layman. It is located in a valley which has been the abode of three races, one of which lived here when Rome was young. Two of those wonderful cliff-dwellings are almost in sight of the modern structure that is soon to submerge some of the lands which formerly produced their harvests.

Owing to the remoteness from transportation, the government engineer had to engage in many enterprises. He built roads to get machinery in. He sawed millions of feet of lumber from the national forests nearby. He turned farmer and raised his own produce, his hay, pork, beef, and chickens. In the construction of the dam 240,000 barrels of cement are required and the lowest bid from the cement manufacturers was prohibitive. This engineer, undaunted, found a limestone ledge near the dam and proceeded to erect a cement mill. It has already turned out 80,000 barrels of cement at a cost far below the lowest bid.

Power was essential, so a dam was built 16 miles upstream, turning a part of the river into a power canal. The canal, having less grade than the river, appears to carry the water uphill.

A part of it is lined with cement. It crosses rough country in viaducts that make us think of the works of ancient Rome. Near the dam site it passes through a tunnel and downward into the mountain, a drop of 220 feet. The water falls upon the turbines located in a unique power-house, a niche in the canyon walls, and generates 4,400 horse-power. The power is utilized by the contractor, it operates the cement plant, the electric-light plant, and is used for other purposes.

THE APACHE LABORERS

On the way to the saw-mills we pass a number of salt caves, each of wonderful beauty. The salt is deposited by salt springs. It is from these springs that the river takes its name, for the waters of Salt River are too salty to drink, but fortunately not salty enough to be injurious when used for irrigation.

The most difficult problem for the engineer to solve was the labor question. The common laborer did not like the job, chiefly, it is said, because he could not spend his money fast enough. This is a government reservation; there are no saloons; no gambling is permitted. There are no towns nearer than 60 miles, so he did not look with favor on the work. The real worth of the engineer came out when he turned missionary and held a pow-wow with the Apache Indians, who have lived in the basin for generations. It seems incredible, yet it is nevertheless true, he succeeded in inducing several hundred of them to go on the pay-roll, and, largely through their labors, the wonderful highway we just crossed over was built.

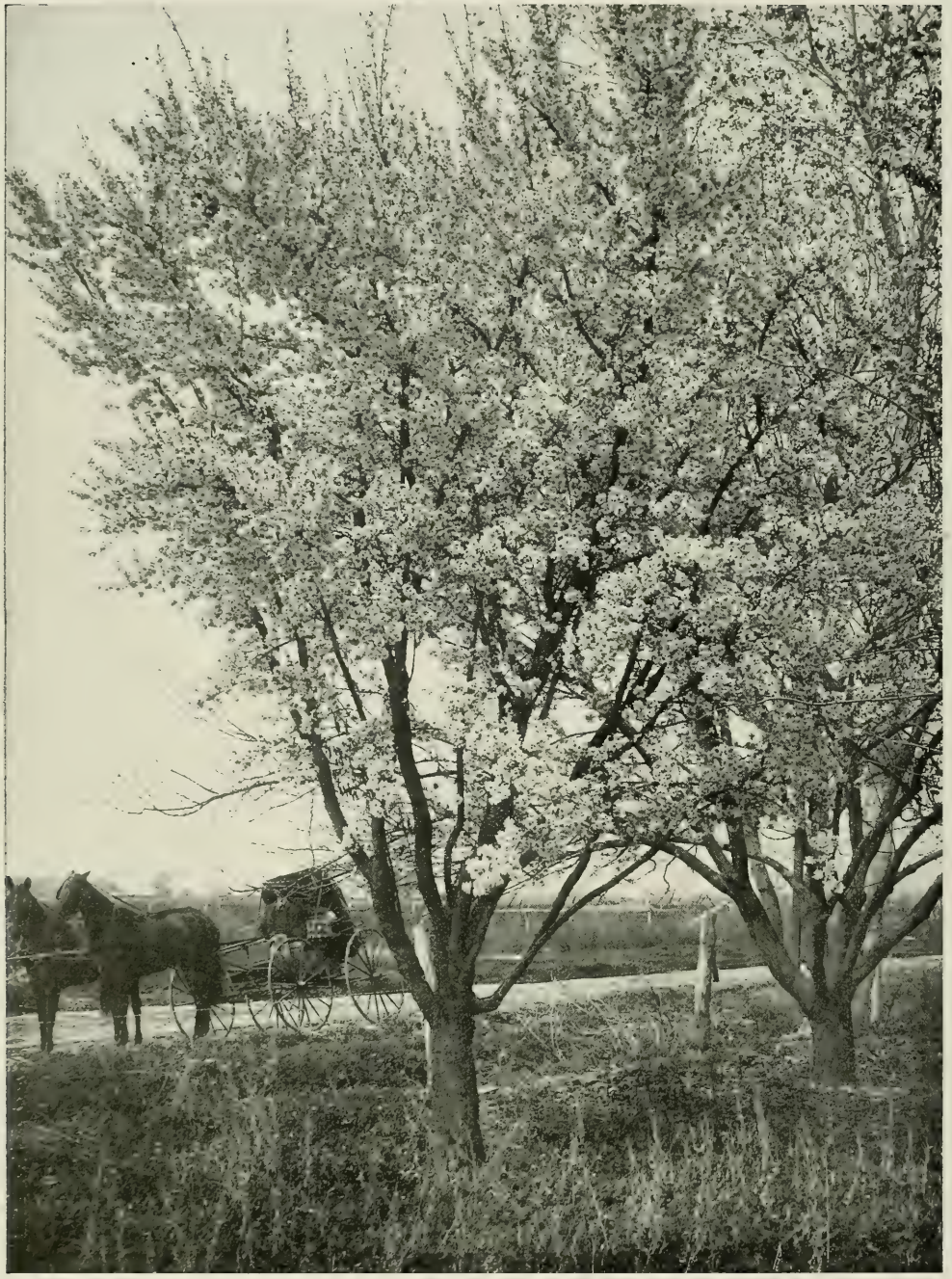
Some of the Apaches developed. Sev-

RAISING MELONS IN THE SALT RIVER VALLEY, ARIZONA

It is understood that the melon growers' crop average net per acre is $200, and gross $300 per acre. This industry is a very profitable one in the Salt River Valley

THE RAISING OF GRAPES IN THE SALT RIVER VALLEY, NEAR MESA, ARIZONA

With proper irrigation in this section of the Southwest almost any kind of fruit can be successfully and profitably raised. Grapes do very well in this valley



ALMOND ORCHARD IN BLOOM IN THE SALT RIVER VALLEY, ARIZONA: SALT RIVER PROJECT, ARIZONA

DATE TREE IN SALT RIVER VALLEY, NEAR MESA, SHOWING THE ENORMOUS CROP OF DATES ON ONE TREE: SALT RIVER VALLEY PROJECT, ARIZONA

THE IVY RANCH, NEAR PHŒNIX, ARIZONA: SALT RIVER PROJECT, ARIZONA

The bee industry in the Salt River Valley is a very profitable industry, as the climatic conditions are perfect, and the clover and alfalfa fields, as well as the wild mesquite, affords good feed for the bees, making this section of the country very well adapted for this business.

eral, starting as common laborers, showed such industry and ability that they were promoted to responsible positions, as road supervisors in charge of their own tribesmen on difficult road work.

There is something like poetic justice in the labor of the Indian with pick and shovel to reclaim a valley he so often watered with the blood of the white man.

While the braves are working for the government on the road, in the cement mill, the brick-yard, and elsewhere, the squaws in the teepees weave wonderful baskets, which find ready sale in the camp and in the valley below.

Sixty miles below Roosevelt another enormous structure is rapidly nearing completion. It will divert the stored waters into canals on each side of the river which lead it to the fields below. One of these canals was partly excavated by the cliff-dwellers, who cut it through solid rock. Think of the patience and time they must have expended in a work like this, when their only implements were of stone.

Settlers are already erecting their homes on the desert, and soon we shall call this the land that God remembered, for, with water from those distant mountains stored in vast reservoirs and led through a thousand miles of canals and ditches, the desert will smile, oases of green will spring forth, and homes of beauty and peace will dot the landscape.

TERMS OF SALE OF GOVERNMENT LAND

If the thousands of inquiries which are addressed to the Statistician of the Reclamation Service, at Washington, D. C., can be accepted as any indication, the West will be the Mecca for hundreds of home-seekers this spring. Many other projects of the government which are ready for irrigation contain large areas of land for sale by private owners who are under agreement with the United States to dispose of their holdings. By the terms of the Reclamation Law no farm will contain more than 160 acres. Every settler must reside upon the land, and must cultivate it for five years before he can secure a patent. The homestead rights of soldiers and sailors are not abridged by the Reclamation Act. Home-seekers should have money—how much depends, of course, upon the settler and the kind of farming he expects to do. While there are numerous opportunities to secure work, the settler with money and equipment will be able to get his land in condition for irrigation and will thus secure an early income from his farm.

A knowledge of irrigation is not absolutely essential. The government will have a practical farmer on each project to advise new-comers. On several projects there are demonstration farms on which are grown the crops adapted to that section. During portions of the year the government will give employment to settlers in constructing canals, laterals, and building roads.

SUMMARY OF WORK DONE

A summation of the work of the Reclamation Service for 1907 shows that it has dug 1,881 miles of canals, or nearly the distance from Washington to Idaho. Some of these canals carry whole rivers, like the Truckee River in Nevada, and the North Platte in Wyoming. The tunnels excavated are 56 in number, and have an aggregate length of 13½ miles. The Service has erected 281 large structures, including the great dams in Nevada and the Minidoka Dam in Idaho, 80 feet high and 650 feet long. It has completed 1,000 headworks, flumes, etc. It has built 611 miles of wagon road in mountainous country and into heretofore inaccessible regions. It has erected and in operation 830 miles of telephones. Its own cement mill has manufactured 80,000 barrels of cement, and the purchased amount is 403,000 barrels. Its own saw-mills have cut 3,036,000 feet B. M. of lumber, and 23,685,000 feet have been purchased. The surveying parties of the Service have completed topographic surveys covering 10,970 square miles, an area greater than the combined areas of Massachusetts and Rhode Island. The transit lines had a length of 18,900 linear miles, while the level lines run amount to 24,218 miles, or nearly sufficient to go around the earth.

The diamond drillings for dam sites

and canals amount to 66,749 feet, or more than 12 miles. Today the Service owns and has at work 1,500 horses and mules. It operates 9 locomotives, 611 cars, and 23 miles of railroad, 84 gasoline engines and 70 steam engines. It has constructed and is operating 5 electric-light plants. There have been excavated 42,447,000 cubic yards of earth and rock. The equipment now operated by the Service on force account work represents an investment of a million dollars.

This work has been carried on with the following force: Classified and registered service, including Washington office, 1,126; laborers employed directly by the government, 4,448; laborers employed by contractors, 10,789, or a total of all forces of 16,363. The expenditures now total nearly $1,000,000 per month.

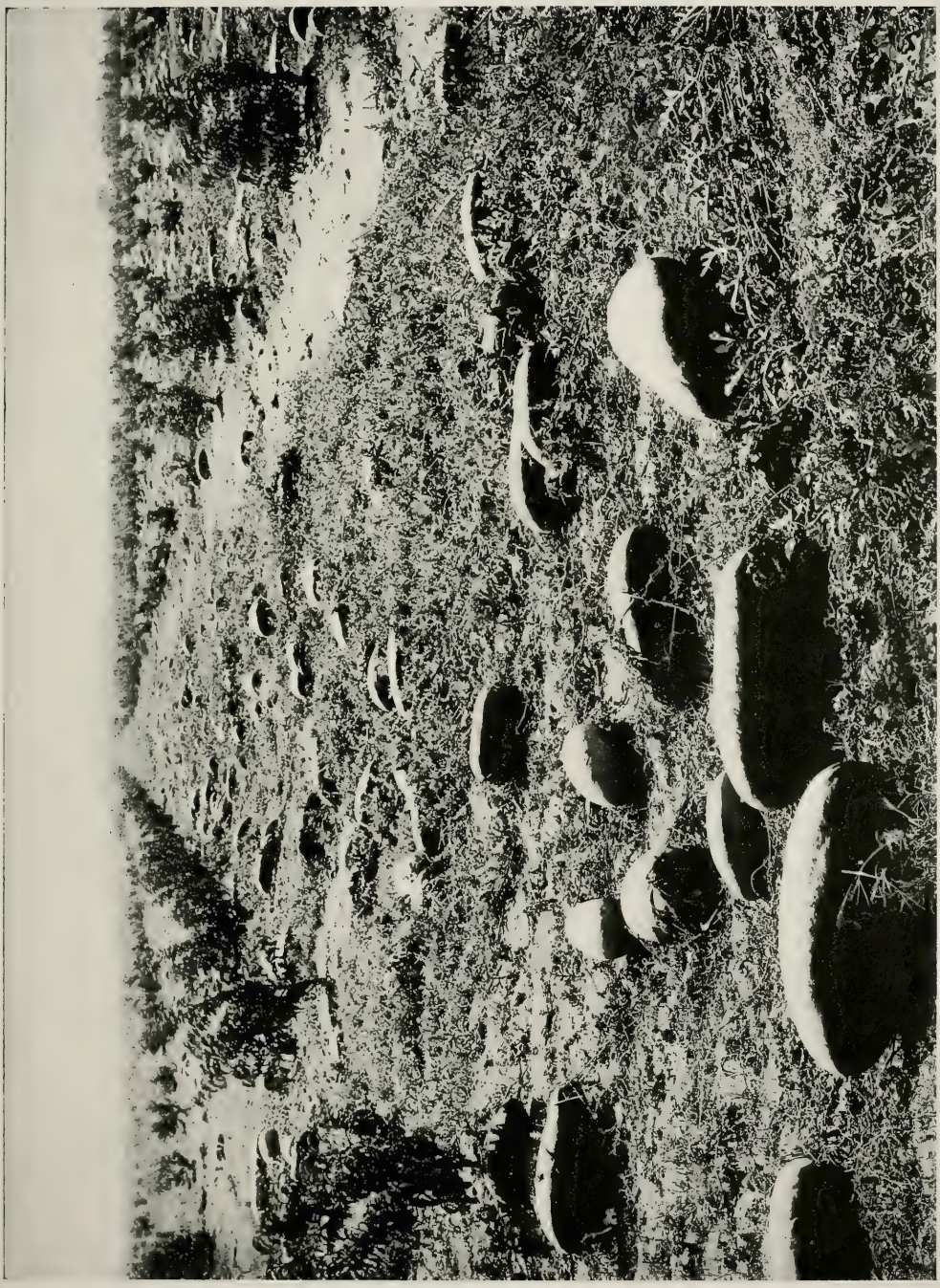
As a result of the operations of the Reclamation Service eight new towns have been established, 100 miles of branch railroads have been constructed, and 14,000 people have taken up their residence in the desert.

The following is a list of the approved projects on which construction has been commenced. The table shows the irrigable area of the projects to the points to which it is expected to carry them during the four years 1908 to 1911; the estimated cost to complete the work to these points; the estimated expenditures to the end of the calendar year 1907, and the percentage of completion December 31, 1907, based upon the ratios of the expenses to that date to the total estimated cost:

Areas, Cost, Expenditures, etc., on Entire Projects or Such Units as it is Expected to Complete by 1911.

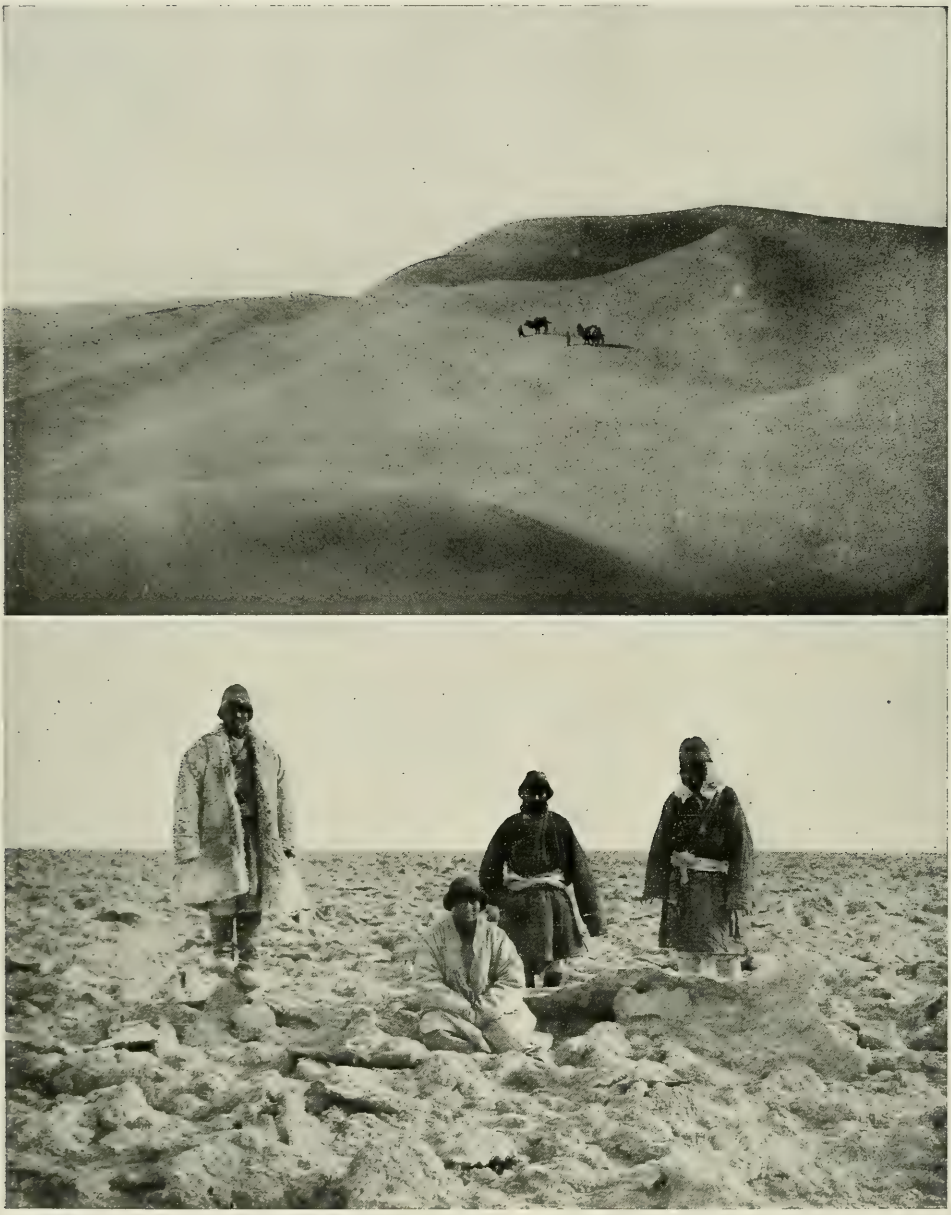
Location.	Project.	Area in acres.	Estimated cost.	Estimated expenditure to December 31, 1907.	Per cent of completion.
Arizona	Salt River	210,000	$6,300,000	$4,362,100	69.2
California	Orland	30,000	1,200,000	16,900	1.4
California–Arizona	Yuma	100,000	4,500,000	1,876,700	41.7
Colorado	Uncompahgre	140,000	5,600,000	2,900,000	51.8
Colorado	Grand Valley	50,000	2,250,000	9,750	.4
Idaho	Minidoka	160,000	4,000,000	1,839,700	46.0
Idaho	Payette–Boise	100,000	3,000,000	1,381,500	46.5
Kansas	Garden City	8,000	350,000	282,000	80.5
Montana	Huntley	30,000	900,000	796,400	88.4
Montana	Milk River, including Saint Mary.	30,000	1,200,000	314,800	26.2
Montana	Sun River	16,000	500,000	344,100	69.0
Nebraska–Wyoming	North Platte	110,000	3,850.000	2,797,300	73.0
Nevada	Truckee–Carson	160,000	4,800,000	3,804,600	79.2
New Mexico	Carlsbad	20,000	640,000	579,400	81.5
New Mexico	Hondo	10,000	370,000	358,600	97.0
New Mexico	Leasburg	10,000	200,000	167,900	83.9
New Mexico–Texas	Rio Grande	160,000	8,000,000	53,200	.6
North Dakota	Pumping, Buford–Trenton, Williston.	40,000	1,240,000	519,600	41.9
Montana–North Dakota	Lower Yellowstone	66,000	2,700,000	751,850	64.9
Oregon	Umatilla	18,000	1,100,000	765,500	69.6
Oregon–California	Klamath	120,000	3,600,000	1,305,080	36.2
South Dakota	Belle Fourche	100,000	3,500,000	1,281,900	36.6
Utah	Strawberry Valley	30,000	1,500,000	418,700	27.9
Washington	Okanogan	8,000	500,000	372,180	74.4
Washington	Sunnyside	40,000	1,600,000	481,180	30.7
Washington	Tieton	24,000	1,500,000	565,420	37.6
Washington	Wapato	20,000	600,000	5,220	8.7
Wyoming	Shoshone	100,000	4,500,000	2,313,990	51.5
		1,910,000	$70,000,000	$30,665,570	

An average of $36.65 per acre.



WATERMELONS IN YOUNG PEACH ORCHARD FARM, KERMAN, FRESNO COUNTY, CALIFORNIA

Showing profitable use of ground while orchard is being brought into bearing. Kerman is a new colony west of Fresno



Photos by Ellsworth Huntington

THE SEA OF SAND OF THE TAKLA MAKAN DESERT

THE SEA OF SALT OF THE LOP DESERT

MEDIEVAL TALES OF THE LOP BASIN IN CENTRAL ASIA*

By Ellsworth Huntington

THE modern West discovered the Lake of Lop-Nor, in Chinese Turkestan, only thirty years ago, yet in the Middle Ages Chaucer and his predecessors seem to have known as much about that region as the average man knows today. In recounting the virtues of the Duchess Blanche, Chaucer speaks of the sweet reasonableness with which she treated her many lovers. She did not hold them in suspense, nor for the sake of proving them did she:

> " . . . Sende men into Walakye,
> To Pruyse and into Tartarye,
> To Alisaundre, ne into Turkye,
> And bid him faste, anoon that he
> Go hoodless to the Drye See,
> And come hoom by the Carrenare."

Apparently the Dry Sea and the Carrenare were the most inaccessible regions of which Chaucer had ever heard, more inaccessible even than Wallachia, Prussia, Tartary, Turkey, and other erstwhile remote places of which he knew little. After much discussion by literary critics as to the geography of the places to which the Duchess did not send her lovers, Prof. J. L. Lowes† has shown that there can be little doubt that the Carrenare is the small salt lake of Kara-Nor, at the eastern end of Chinese Turkestan. It lies in the vast "Gobi" or "Desert" about 200 miles west of the supposed end of the Great Chinese Wall. As a matter of fact the remains of the wall extend not only to, but beyond the lake, as Dr Stein has recently discovered. Professor Lowes concludes further that the Dry Sea is the great sandy desert of Taklamakan, a few hundred miles to the west of Kara-Nor. It appears to be either this or the broad salt plain of the ancient bed of the Lake of Lop-Nor, between Kara-Nor and Takla-makan. The terrible summer heat and winter cold of the whole region make it indeed a place to which few people would be so hardy as to go "hoodless" at any season.

Apparently European knowledge of Central Asia in Chaucer's day was derived more or less directly from the famous Letters of Prester John, perhaps by way of the plagiarized accounts of Sir John Mandeville. Prester John was a semi-mythical Christian prince who is supposed to have lived in Central Asia, and who sent boastful letters to the Pope of Rome in the latter half of the twelfth century. The Letters aroused great interest in Europe for three or four centuries, and many attempts were vainly made to find the author's country. At first he was supposed to live in Asia, as was probably the case. Hundreds of years after the writing of the letters, however, the Portuguese heard of a Christian king living in Abyssinia, and, supposing him to be the great Prestor John, sent several expeditions to form an alliance with him. The vaunting boasts of the wide dominion and great splendor of Prester John, whose butler is said to have been a primate and a king, and his steward an archbishop and a king, are certainly false. Nevertheless the Letters contain a large amount of garbled truth, and their writer must have known a good deal more about Central Asia than has generally been supposed.

He tells us that, "Among other things which are very wonderful in our country is a sea of sand without water. For the sand moves and swells in waves in the manner of all seas, and is never still. This sea cannot be crossed either by boat or by any other method, and of what sort the land may be beyond it no one can know. And although water is absent

* Abstract of an address to the National Geographic Society, January 17, 1908.
† Modern Philology, vol. iii, 1905, pp. 1–46.

entirely, nevertheless there are found on the shore on our side many kinds of fish more delicious and sweet-tasting than are ever seen anywhere else." Other wonders are related of the same region. For instance, to quote Professor Lowes, "Into the Sandy Sea itself flows, three days of the week, a river of stones without water, impassable while its flow continues. Beyond it lies another river, whose sands are mere precious stones; or sometimes this River of Gems flows *through* the Sandy Sea, and is indeed the Sabbatic River, flowing six days and resting the seventh, which keeps the ten tribes of the Children of Israel from crossing into the land of Prester John. And in one part of the desert where the sea lies is a people with round feet, like horses' hoofs; and in another part is the land of Femenye itself," a land where none but women dwell, and they are "very stark and cruel;" and no man dare bide more than an hour.

THE SEA OF SAND

Strange as these stories sound, they are only slight perversions of the truth. During a visit to the Lop Basin in 1905–6 the writer observed facts which may perhaps explain all of them. For instance, when first one sees Chinese women of high class their diminutive feet are strangely suggestive of the hoofs of animals. As to the fable of the land of Femenye, there is nothing now to give rise to it directly. Marco Polo relates, however, that in his day in the region of Hami, not many hundred miles from Lop-Nor, none but women were found in the villages when caravans arrived. The men departed in order that the travelers might be more comfortable, and might be the more ready to pay for entertainment. Even today the people of Hami possess customs which seem to be a reminiscence of the ancient habit.

Other portions of the old accounts are equally explicable. The Lop Basin, in the very center of Asia, is a great depression, 1,400 miles long from east to west and 400 wide. Around it lies a ring of lofty plateaus from 10,000 to 20,000 feet high. At their base is a ring of piedmont gravel, almost destitute of life, and sloping gently inward like a huge beach from 5 to 40 miles wide. Then comes another ring, the zone of vegetation, where alone there are plants and an opportunity for human inhabitants other than the few nomads of the plateaus. Finally within the zone of vegetation lies a vast desert area about 1,000 miles long and 250 wide. Its western three-quarters consist of a veritable Sea of Sand, the Takla-makan desert, yellow or gray on the edges, pink in the inner portions. Row after row of almost impassable sand dunes has been piled up by the wind to heights of full 500 feet in places. The smallest dunes often move forward hundreds of feet in a year in the direction of the prevailing winds; the largest scarcely move at all. The sand is most beautiful, with its graceful sweep of wavy dunes and ripples, but the natives hate and fear it. It has proved the grave of many a native gone mad with thirst in the vain search for the gold supposed to lie hidden in sand-buried ruins.

A few rivers flow into the desert of Takla-makan. Most of them soon wither to nothing. All are very variable, and some, such as the Vash Sheri, flow in raging, impassable torrents during sunny weather in summer, but dry up when cloudy days among the mountains prevent the melting of snow. The dry beds of these "Sabbatic" streams form veritable "rivers of stones." In certain cases one might almost say with the old chronicler that there are streams "whose sands are mere precious stones." When the Khotan and Keriya rivers are low, crowds of natives go out from the oases to dig in the gravel of the river-bed for jade, one of the most highly prized of Chinese precious stones. Gold also is found in the upper parts of the beds of the Keriya and other rivers.

THE SEA OF SALT

East of the Sea of Sand there lies a Sea of Salt, the bed of the ancient Lake of

Photos by Ellsworth Huntington

A LOPLIK HOUSE OF REEDS

LOPLIK WOMEN AND CHILDREN

Lop-Nor. Today the lake is merely a marsh, fed by the Tarim River, and filled with huge reeds 12 or 15 feet high. Near the mouth of the river, where alone the water is fresh enough to support life, the Lopliks have planted their villages of reeds. Formerly, according to their own account, they lived wholly on fish and birds caught in the open lanes and pools of the swamp, where the fishermen still paddle their canoes of hollowed poplar. They cannot go far to the east, for there the swamp grows more and more saline, until finally it merges into a great plain of salt, the bed of the expanded lake of former times.

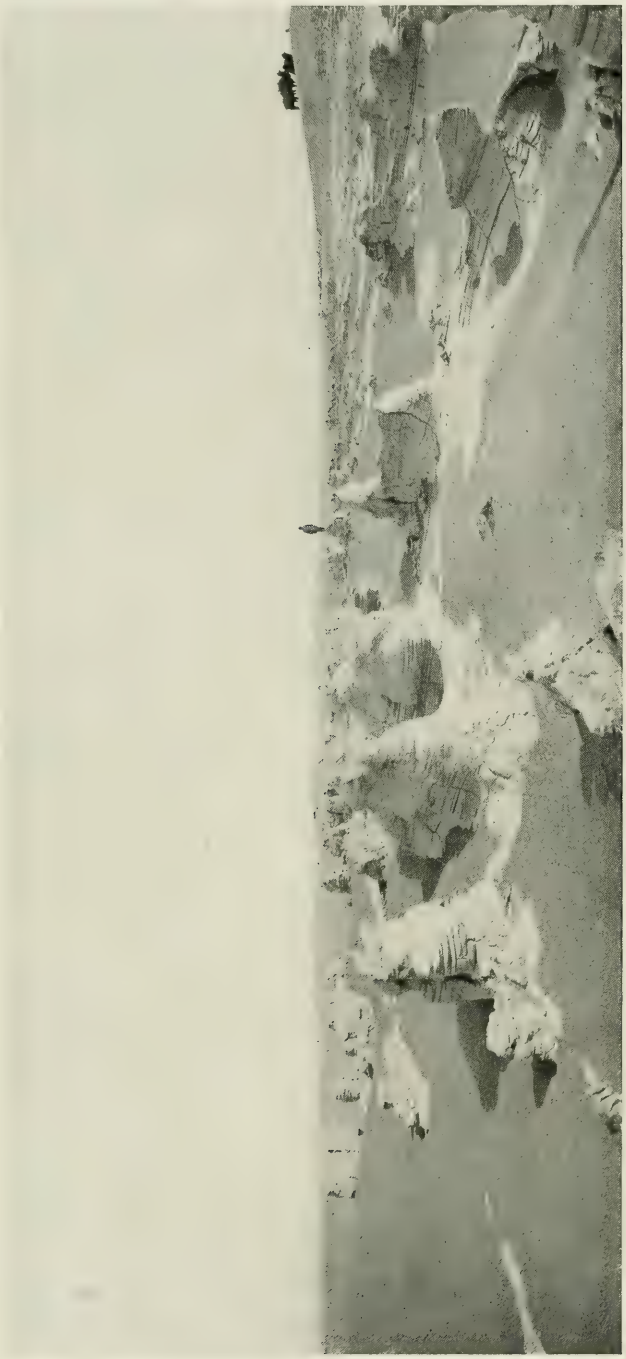


Photo by Ellsworth Huntington

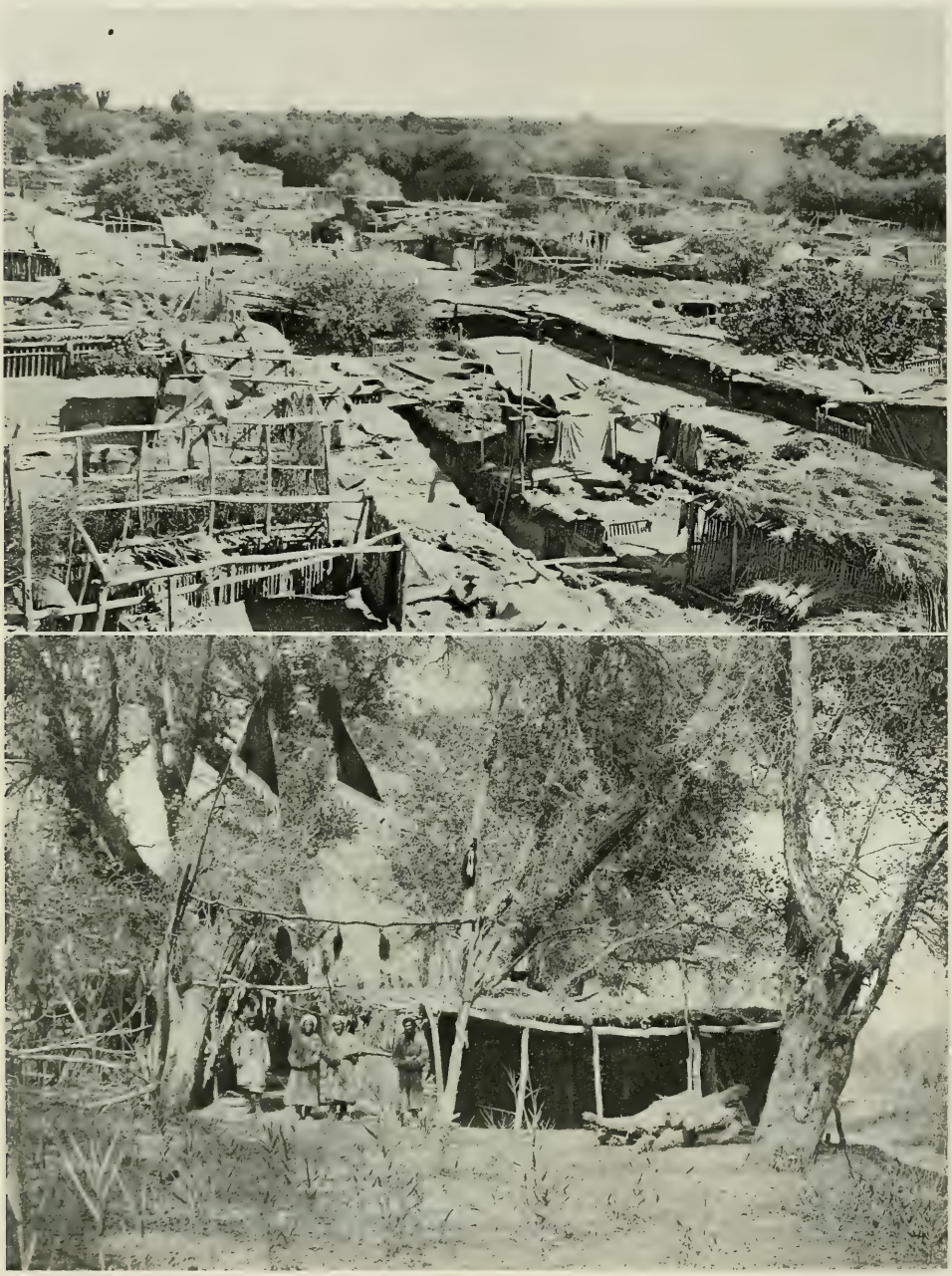
ÆOLIAN EROSION IN THE LOP BASIN

The old bed of Lop-Nor is one of the most absolute deserts in the world. In January, 1906, the writer explored this hitherto unknown waste, where even the hardy natives never venture. For five days the caravan stumbled wearily over a sea of rock-salt broken into huge polygons 10 or 12 feet in diameter, which had buckled up around the edges to a height of from one to three feet. It was like the choppiest sort of sea frozen solid. When we selected what appeared to be soft places in which to pitch the tents, the iron tent pegs bent double. When we wanted to spread our beds to sleep, it was necessary to hew away junks of salt with an axe. For 60 miles north and south and for nearly

Photos by Ellsworth Huntington

CHANTOS OF THE OASIS OF KHOTAN GATHERED FOR THE WEEKLY SUMMER FETE IN HONOR OF THE LIFE-GIVING RIVER

The woman in the foreground (right) suffers from goitre, a common malady, said to be due to malicious genii who grip people by the throat while they are sleeping



Photos by Ellsworth Huntington

THE OASIS OF KHOTAN

Entrance to the Shrine of Imam Jafir Sadik in the southern part of the Takla-makan Desert. A hundred yards from this gate one enters sand like that of the upper photograph on page 288. The Shrine is near the end of the Niya River.

200 east and west there is absolutely not a sign of any living thing.

It is relatively but a little while since Lop-Nor was much larger than now and expanded to such a size that most, if not all, of the old bed was covered by water, as is proved by the location of ancient roads and beaches. At the time of Christ, as the writer has shown in "The Pulse of Asia," the lake appears to have been of large dimensions. Then it diminished in size, and about five centuries later was probably as small or smaller than it now is. Later it expanded, and with varying fluctuations remained comparatively large until about 1600 A. D. Now it has once more diminished, and the people who formerly were supported by it have largely died off. A century or two ago they used to carry fish two or three hundred miles eastward to the Chinese cities where Nestorian Christians lived in the days of Marco Polo and earlier. Now the desert has become so rigorous and the fish have so decreased in number that the traffic has been given up. The writer of the Letters of Prester John was almost right when he said that fish were procured from the Sea of Sand. They certainly came from the border between it and the Sea of Salt.

Further details might be added showing that the statements in the Letters could only have been written by a man who had some knowledge of Central Asia, although his information may have been much distorted. Enough has been said to show that in Chaucer's day and earlier the Lop Basin was by no means an entirely unknown land. It is a continual surprise to mankind to find how wide a knowledge was possessed by earlier generations.

* For further information on this part of the world, the reader is referred to "The Pulse of Asia:" a journey in Central Asia, illustrating the geographic basis of history. By Ellsworth Huntington. Pp. 415. Illustrated. New York: Houghton, Mifflin & Co. 1907. $3.50.

THE KEY TO THE PACIFIC

By Hon. George C. Perkins

United States Senator from California

THE importance of the Hawaiian Islands to the Pacific Coast states is supreme. Those states in the future will rely more and more for their prosperity upon the trade with the Orient across the Pacific, and with the East and Europe through the Panama Canal. That there may be a guarantee that this commerce shall endure and increase in volume, the United States must be at least the equal in naval power of any nation using those waters for the transportation of goods; and a part of the power of a navy is supplied by its bases, from which all exposed points can be best watched and whence aid can be most quickly sent.

As such a base the Hawaiian Islands present advantages to us which have no counterparts elsewhere in the Pacific. Lying within easy steaming distance of our Pacific coast, as naval vessels are today constructed, they afford a point from which the whole North Pacific Ocean can be patrolled by cruisers, and from which the commerce of the Panama Canal can be protected. They afford a strategic point whose vast significance can be realized best by supposing the islands in the hands of a hostile power engaged in war with us. From that point the enemy could send out cruisers to sweep from the sea the commerce of the Pacific ports and of the canal, while it would afford a base of operations for attacks on our Pacific Coast ports, as well as on the Canal Zone.

With these islands in the hands of an

THE CROSSROADS OF THE PACIFIC

enemy, it is doubtful whether we could control the canal for a day, while the entire coast line of the Pacific states and the bays and harbors of our rapidly growing Alaska would be in constant expectation of a hostile descent. For the defense of our Pacific coast and its commerce, therefore, the Hawaiian Islands are vital, and this fact is recognized, I think, by every one who has given the matter careful attention.

In addition to the strategic relation to the Pacific coast of the United States, which Hawaii possesses, it has a similar relation to our island possessions further west—Guam and the Philippines. Hawaii and Guam are the ocean stations of the American cable between the United States and our possessions on the coast of Asia, and as such are of vast importance in any scheme of defense of the Philippines or of the Pacific states. This line is of the greatest use to our commerce, and its safety can be assured only through means of defending its island stations against hostile attack.

And that commerce, which will continue to grow as the years pass, is not alone with progressive Japan and teeming China, but with our own fertile islands on the Asiatic coast and with the great English-speaking colonies of Great Britain in New Zealand and Australia. In 1893 our greatest authority on the sea power and naval strategy, Captain A. T. Mahan, wrote with reference to the proposed annexation of Hawaii:

"To any one viewing a map that shows the full extent of the Pacific . . . two circumstances will be strikingly and immediately apparent. He will see at a glance that the Sandwich Islands stand by themselves in a state of comparative isolation, amid a vast expanse of sea; and, again, that they form the center of a large circle whose radius is approximately the distance from Honolulu to San Francisco . . . this is substantially the same distance as from Honolulu to the Gilbert, Marshall, Samoan, and Society Islands, all under European control except Samoa, in which we have a part influence.

"To have a central position such as this, and to be alone, having no rival . . . are conditions that at once fix the attention of the strategist . . . But to this striking combination is to be added the remarkable relations borne . . . to the great commercial routes traversing this vast expanse.

"Too much stress cannot be laid upon the immense disadvantages to us of any maritime enemy having a coaling station well within 2,500 miles, as this is, of every point of our coast line from Puget Sound to Mexico. Were there many others available we might find it difficult to exclude them all. There is, however, but the one. Shut out from the Sandwich Islands as a coal base, an enemy is thrown back for supplies of fuel to distances of 3,500 or 4,000 miles—or between 7,000 and 8,000 going and coming—an impediment to sustained maritime operations well nigh prohibitive . . . It is rarely that so important a factor in the attack or defense of a coast line—of a sea frontier—is concentrated in a single position, and the circumstance renders doubly imperative upon us to secure it if we righteously can."

Hawaii is on the track of probably all the trade which the Pacific Coast states have with the rest of the world, and therefore, as a strategic point, it is of supreme importance that it be joined to us "by hooks of steel" which it would take the navies of the world to break.

The relation of a strategic point like Hawaii to the safety of the nation is illustrated by the relation of Gibraltar and Malta to the safety of Great Britain. The control of the Mediterranean is essential to England, as thereby she dominates the coasts of all the adjacent countries and controls hostile movements. "If," writes Lord Brassey, "we are resolved to retain our hold on the Mediterranean, it is imperatively necessary that our two naval bases at Malta and Gibraltar should be made secure from attack and efficient for the repair and protection of the fleet. In Malta and Gibraltar we hold strategical positions of the utmost importance." They are of utmost importance because they control the trade route through the Suez Canal, dominate the coasts of what may at some time be hostile nations, and render unnecessary the constant presence in the Mediterranean of a fleet of overwhelming strength. That strength may be safely confided to the channel and home fleets, which, with bases in that sea, can at any time secure control of it.

"If we abandon the Mediterranean," says Lord Brassey, "we cease to be a first-class power in Europe. . . . Upon a consideration of all the circumstances, it is clear that the dignity, the wealth, and the influence of England for peace depend on the retention of a paramount position as a naval power in the Mediterranean. We have that position now, and the recent manifestations of popular sentiment have shown that we are resolved to keep it." In that last sentence substitute for the words "England" and "Mediterranean" the words "United States" and "Pacific" and see if it will not apply with peculiar aptness to

our own position on the greatest of the world's oceans. I think it expresses the present situation with exactness, and is an unanswerable argument in behalf of securing to the United States the Hawaiian Islands as Great Britain has secured to herself Gibraltar and Malta.

These islands would not long remain ours, in case of war with a sea power, if they remain in the condition in which they now are. Gibraltar and Malta are the strongest fortresses in Europe. So should Hawaii be the strongest fortress in the Pacific. The President recognizes this, and in his latest annual address recommends an appropriation for the fortification of Pearl Harbor. The War Department also recognizes it, and recommends the appropriation of $1,100,000 with which to continue the necessary work. That this work should go on without intermission until we have established there an impregnable naval base goes without saying. The only thing needed is money, and I am sure that Congress sees the necessity of voting liberal appropriations.

Pearl Harbor is susceptible of being made another Gibraltar, where the largest fleet may safely lie and where repairs may be made at leisure. It consists of an elliptical lagoon 8 miles long by 4 wide, with a depth of water ranging from 30 to 130 feet. It is completely land-locked, preventing surprise attack from submarines or torpedo boats, as well as from hostile fleets. In the rear are mountain ranges 3,000 or 4,000 feet high, on the slopes of which are the military reservation, about 10 miles from the harbor, where a salubrious climate is secured. Reservations for fortifications, wharves, and all that is necessary for a first-class naval station have been secured, and this channel has been dredged to 30 feet, and may easily be deepened much more and straightened to insure easier navigation for battleships, which work can be done, it is thought, at an expense not exceeding $750,000, the value of the customs receipts of Honolulu for six months.

General Schofield, in 1872, reported on Pearl Harbor that "it could be completely defended by inexpensive batteries on either or both shores, firing across a narrow channel of entrance. Its waters are deep enough for the largest vessel of war, and its lochs, particularly around Rabbit Island, are spacious enough for a large number of vessels to ride at anchor in perfect security against all storms. Its shores are suitable for building proper establishments for sheltering the necessary supplies for a naval establishment, such as magazines of ammunition, provisions, coal, spars, rigging, etc., while the Island of Oahu, upon which it is situated, could furnish fresh provisions, meats, fruits, and vegetables in large quantities."

Too much stress cannot be given to the fact that if Pearl Harbor is to be fortified successfully the work must be done in time of peace. When war comes it would be too late, and woe to us if we are not prepared for defense as well as for attack. It behooves Congress, therefore, to give special attention now to the necessities of Pearl Harbor, and to liberally provide the means by which it may stand forever the strongest bulwark which we possess in the western ocean.

HAWAII FOR HOMES

By H. P. Wood

MUCH has been written about the charming climate of Hawaii, the beautiful scenery, and the smooth seas to the coral-fringed Paradise; and now that a struggle for the mastery of the Pacific, that ocean of such great potentialities, is on among the nations of the earth, it is seen that Hawaii,

from its strategic position, must soon become a great military stronghold, probably the greatest in the world. Certain it is that Pearl Harbor, on the Island of Oahu, near the city of Honolulu, will be rapidly developed as America's mid-Pacific naval base, the entire island of Oahu being practically converted into a vast military encampment. The protection of the Pacific coast and our prestige as a nation demand that this be done.

Hawaii's future prosperity, however, is not dependent upon its unequaled climate, beautiful scenery, or strategic position, but will be due to the fact that here is found, as possibly nowhere else on the face of the globe, all that goes to make perfect home conditions—a place where a man with a few acres of land can earn a good living for himself and family and provide for a comfortable old age, surrounded by all that tends to make life enjoyable.

Of Hawaii it has been well said: "A section able to produce such a variety of tropical articles as may be produced in the Hawaiian Islands, and having free hospitality of its citizens by those who have been privileged to voyage over access to a market demanding such enormous quantities of those various articles as does the market of the United States, ought to become not merely prosperous, as it already is, but one of the most prosperous and perhaps the most prosperous of all the tropical communities of the world. With the power to produce sugar, of which the United States imports more than one hundred million dollars' worth a year; with the power to produce coffee, of which we import from seventy-five to one hundred million dollars' worth annually; with the power to grow rubber, of which we import fifty million dollars' worth annually; with the power to produce tropical fruits, of which we import thirty-five million dollars' worth annually; with the power to produce sisal, of which we import fifteen million dollars' worth annually, and with the power to produce cocoa, of which we import nearly ten million dollars' worth annually, the possibilities of increased prosperity in Hawaii seem very great."

Today the advantages offered by Hawaii are enjoyed by comparatively few people—about 200,000, including the alien labor on the different plantations, or say 32 persons to the square mile for the entire area of 6,400 square miles. Switzerland, a bleak, inhospitable country as compared with Hawaii, sustains in comfort a population of 3,356,000. The same number to the square mile would give the territory of Hawaii a population of 1,344,000, a number equal to that supported by the broad plains and fertile acres of the State of Arkansas; or if populated as Italy, Hawaii would have 1,870,000 people within its boundaries, while Belgium's rate of population to the square mile would give Hawaii 3,760,000, or 19 times the present population.

Hawaii offers room and opportunities for many hundred thousands of home-seekers. The agricultural colleges throughout the country could perform splendid work in tropical agriculture, entering into correspondence with the dean of the College of Agriculture, Honolulu, Hawaii, and thus secure reliable data as to the wonderful growth of the pineapple industry and the possibilities in rubber, tobacco, tropical fruits, etc. By doing this they would confer a lasting benefit upon thousands of young men throughout the country who are now looking around for openings and who will find in Hawaii just the opportunities they are seeking.

The territorial authorities are most desirous of settling the islands with a citizen class of small landed proprietors, and will gladly welcome all home-builders who are strong and industrious, able and willing to work. It is the hope of those having the best interests of Hawaii at heart to make of the islands an ideal American community.

WHY NIK-KO IS BEAUTIFUL

By J. H. De Forest, Sendai, Japan

JAPAN is confessedly the most beautiful country in the world. Everywhere you go you have in sight the two essentials of bewitching scenery, mountains of every size and shape indented by picturesque canyons and lovely valleys, all based on water in bays and inlets and ocean. It is a land of perpetual beauty, conspicuously central to which is the peerless Fuji, the only mountain on the globe that rises 12,365 feet in one impressive unbroken curve from the ocean.

But hidden among all this scenic grandeur the one great park of wooded mountains around a crater lake that with foreigners and natives alike takes the prize is the Nik-kō region. *Kek-kō* is the Japanese word for superlatively splendid, so that all through Japan these two words are inseparably mated—Nik-kō and Kek-kō. Don't say Kek-kō until you've seen Nik-kō. You have no sufficient knowledge of the splendid until you have visited this park of splendor. If you try to analyze Nik-kō's splendor, one captivating feature is the avenue of mighty cryptomerias that for a dozen miles forms a lofty Gothic archway leading up to the village 2,000 feet above the ocean. Another important element is the waterfalls and cascades that burst from the sides of the wooded mountains or tumble in amazing confusion over precipitous rocks into the dark, narrow valleys. Yet one more element is the exceptionally large crater lake, Chūzenji, 4,385 feet up in the clouds, surrounded by the old crater walls, portions of which are now gently sloping and covered with dense forests, while on another section rises the dead peak of the last volcano that helps to make Nik-kō and its vicinity so wonderfully beautiful—Nantai-zan.

But nature's work has been richly supplemented by man's hand in beautifying this paradise. There is the red bridge of one span (80 feet), which is reserved exclusively for His Majesty the Emperor. When General Grant visited Nik-kō as the guest of the nation, this sacred bridge was opened for him, but he modestly declined to cross the Imperial bridge, thereby winning the deep reverence and affection of the people. Even the present Crown Prince a few years ago refused to cross the bridge, preferring to identify himself with the people by taking the common bridge just below.

Beyond the bridge, amid tall cryptomerias, is a historic Buddhist temple, whose sweeping double roof is in perfect harmony with its surroundings. You cannot but gaze at it whenever it appears in sight. A little farther on is the mausoleum of Ieyasu, the greatest statesman of feudal Japan, under whose orders the political Christianity of the Catholics was stamped out in fearful slaughters of believers and the country closed against foreign intercourse. High above the mausoleums of Ieyasu and his grandson Iemitsu, on a rocky formation, is Ieyasu's massive bronze tomb.

But apart from what man has done, what makes this region so enchantingly beautiful? What is the secret of this beauty? This was the question that continuously challenged me as I spent a few weeks in this environment. In general it may be said that Japan's beauty is of a different type from much of our European and American beauty. New England, for example, with its shores, its mountains, its innumerable lakes, all near sea-level, is indeed beautiful, but its rounded hills, its moraines, and lakelets are all the work of immense glaciers. Japan, however, is wholly the child of volcanoes and earthquakes. Hence the long curving slopes of many of the mountains; the abrupt and frightful contortions of portions of the mountain scenery; the marvelously entrancing crater lakes far up in the skies. Any one

THE MONSEKI OF RINNŌ TEMPLE, ABBOT HIKOSAKA

used to our glacial beauty is at first sight surprised and captivated by Japan's volcanic beauty.

Now Nik-kō seems to have gathered into its own region all the beauty possible under volcanic conditions. The long egg-shaped Lake Chūzenji was once the crater of a horrible volcano. It blew high in air from its huge mouth the froth of its lavas and buried deep the whole region around with its so-called ashes. Then its lavas rising in the crater broke through the weak tufa walls and flowed in red-hot streams over the coarse ashes in every possible direction, baking them into tough, porous rocks. Later on another prolonged blast of coarse ashes and rocks would bury the lavas scores of feet deep, only to be again overflowed by boiling streams of lava, until the whole

THE WIND GOD IN IEMITSU'S MAUSOLEUM

region became alternate strata of lava and tufa, broken here and there by earthquakes of tremendous power. And out of this frightful desolation and disorder has come the exceptional beauty of Nik-kō! Every waterfall there tumbles off from a lava bed, and wherever possible cuts down through the underlying tufa and flows along on the next lower lava shelf.

It adds tenfold to the enjoyment of seeing the finest waterfall in Japan, Kegon, if you only notice how it was made. It is one huge spout of water about 20 feet in diameter jumping about 250 feet into the pool below. From top to bottom it is white with foam, and, as it falls, from its edges shoot off comet-like bunches of water with spreading tails of thinner foam, until the whole has passed the lava cliff a hundred feet thick. When to the beauty of this magnificent column of water-foam is added the beauty of a fringe of baby waterfalls bursting from the underlying tufa, and half encircling the giant spout, they all together take the final plunge of a hundred feet more: and when the gorgeous foliage of the ravine bends across the gorge, so that against this spotless white foam you can see the shapes of the branches and leaves, you have a picture the memory of which abides forever with every lover of nature.

In descending the ravine to the place where Kegon looks its best, we pass close to one of the tufa strata, from the holes of which shoot out water enough to make a powerful, roaring stream, and this cascade in turn makes another famed waterfall called Haku-un, the White Cloud. The photograph plainly shows the thick lava above and the innumerable streams breaking out where the lava meets the tufa.

Coming down from Chūzenji to Nik-kō any one can see lavas and tufas alternating where the mountain sides have been denuded by storms or broken by earthquakes. I saw seven such strata in one place, and it was that sight which gave me the key to the beauty of Nik-kō. At one of the tea-houses on the road are seen two charming falls in the distant ravines tumbling off thin lava beds. They have cut through one tufa bed and are flowing along on the lava bed, from which they tumble down to another. The stream that flows through Nik-kō is con-

NEAR IEYASU'S MAUSOLEUM

On the way to Chuzenji is a graveyard so overshadowed with cryptomerias that it is hard to get good photos. This avenue is formed by the lofty monolithic gravestones of the illustrious Samurai, who had the Shogun's permission to commit *hara kiri* in order to accompany their beloved Ieyasu on his journey of death.

fined in narrow and winding lava channels just above the town, where the swollen waters boil with frightful noise. It is one of the sights of Nik-kō to watch the violent threshing of the water there upon the twisted sides and cavities of the unyielding lava. Just below this hell-gate, called Gamman-ga-fuchi, is the Imperial bridge, one of the charms of which to me is that its massive stone posts rest on the last appearance of the lava beds that flowed down from an unknown volcano of the distant past. Far up the hill to the left the tomb of Ieyasu stands on the highest part of this same ancient lava stratum.

The artificial beauty of Nik-kō centers around the Rinnō temple and the mausoleums of Ieyasu and Iemitsu. To meet the two men who hold the highest places in the sacred enclosures, and talk with them about the intensely interesting history of this region, is a real education. Being favored through our (then) legation with letters of introduction from the Home Minister, I was shown the national treasures of the Buddhist temple and of the Ieyasu mausoleum. This is no place to go into details, but I was so cordially met by these gentlemen that I wish to add to this partial description of Nik-kō the faces of these distinguished officials from photographs they kindly gave me. The position of high priest, or abbot, in Rinnō-ji is an Imperial appointment. The young princes and princesses who spend

THE VOLCANO ASAMA

Asama is a living volcano, 8,000 feet high, south of the Nik-kō region and a favorite tramping place for summer tourists. Over a hundred years ago the rising lavas broke through the weak tufa sides and flowed down a valley. These steam-filled lavas exploded into most frightful shapes and form one of the most desolate of views. Had the lavas of Nik-kō been torn into such beds of desolation there would be no such beauty as is there now.

KUSATSU HOT SPRINGS, BETWEEN THE VOLCANOES ASAMA AND SHIRANÉ

The peak of Shirane appears in the distance, where a crater lake is being made. The exterior of the bath-house whose interior is shown in the next photos. Hundreds of people afflicted with syphilis and leprosy gather at this famous hot spring.

the summer at Nik-kō used to go every morning to the court of the temple and "worship" the souls of the officers who died in the Russian war. The alcove before which they knelt was filled with the photographs of these brave and loyal men. The distinguished title of the Abbot Hiko-saka is *Monseki,* which conveys the meaning of Imperial appointment. It was in this temple court that General and Mrs. Grant were entertained, and as in those early days (about 1878) there was no foreign hotel in Nik-kō, and therefore no such thing as a bedstead, the priest had a bedstead made worthy of a military hero. There is no scrimping of timber in its frame, and, since springs were wholly unknown, they wove the bedstead with bands of plate iron! A mate to this bedstead was made on the same heroic plan for Her Excellency Mrs. Grant. When this famous couple went to bed, of course they found over the iron network a pile of soft silk *futons* a foot thick.

The official chief of the Shogun shrines is Baron Naka-yama, one of the highest in rank among Shintoists. It is well to remember that Shintoism is not now called a religion by the Japanese; it is a cult. No government has ever handled the perplexing question of church and state so admirably as has that of Japan. Seeing that Shintoism with the "worship" of the Imperial ancestors and national heroes would surely lead to a clash with Christianity, Shintoism was officially changed from the grade of a religion to that of a cult which concerns Japan alone. This step leaves it possible for a Christian to "worship" at the shrines just as we worship when we take off our hats at the tomb of Washington. In the course of a delightful conversation I asked the Baron, "Is there any objection to a Shintoist becoming a Christian?" He replied with a smile, "None whatever."

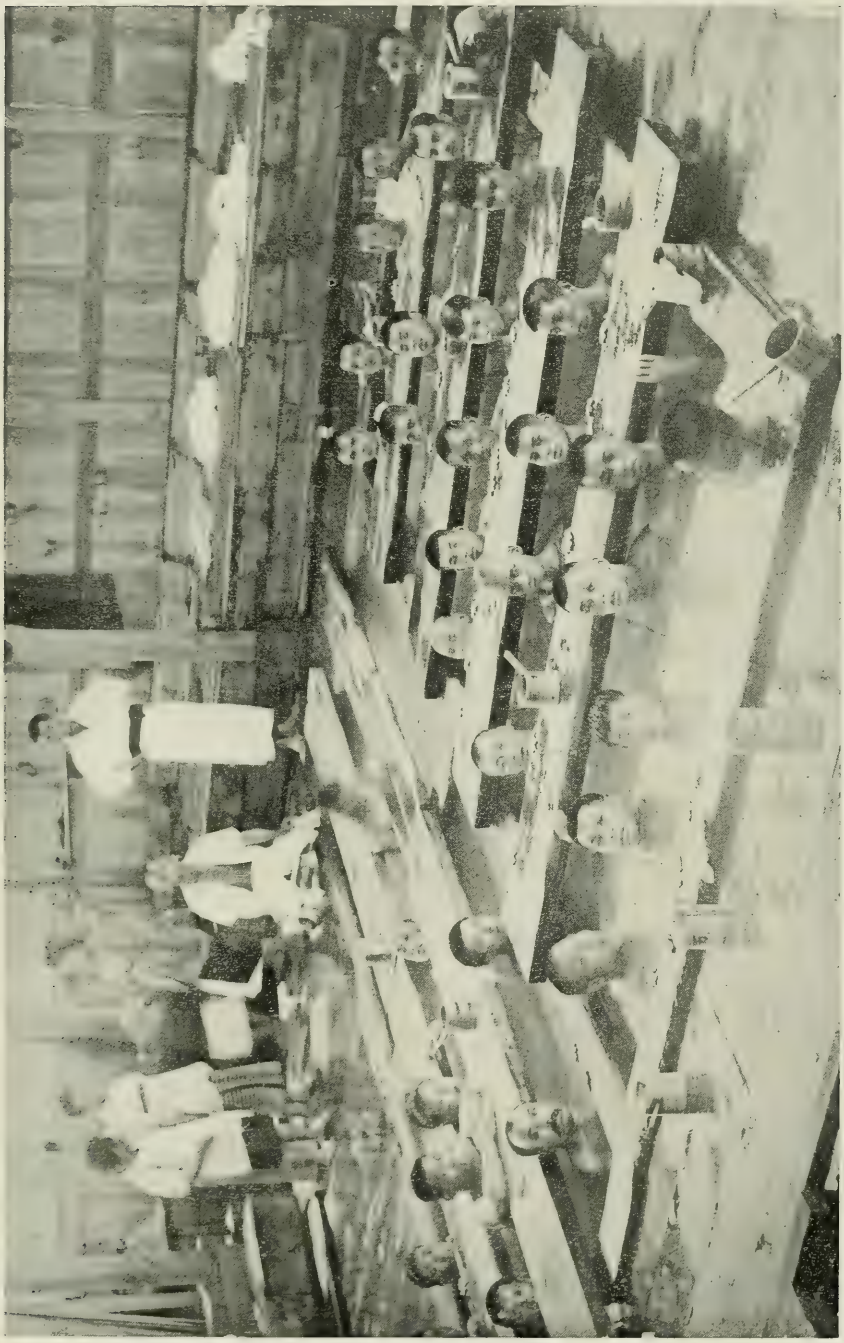
Nik-kō is a great national center of religion and reverence in an environment of marvelous beauty.

KUSATSU HOT SPRINGS, NO. I. INSIDE THE BATH-HOUSE FOR MEN

The water is from 130° to 160°, and would scald any one. By splashing these boards, the water in an hour is reduced to 120° heat, when patients can safely enter, though even then they shrink from the almost intolerable heat. The water might be cooled by pouring in cold water, but this would spoil the medicinal qualities.

KUSATSU, NO. 2

The patients have to pour hot water over their heads 100 times before entering, in order to prevent bad effects. In this photo they are dressed for the sake of the picture. Generally there is no such display of propriety, but just the reverse



KUSATSU, NO. 3

They all get in together at the command of the bath-master and endure, as best they can, the semi-scalding for three or four minutes, and when the time is announced for exit, they get out much faster than they got in

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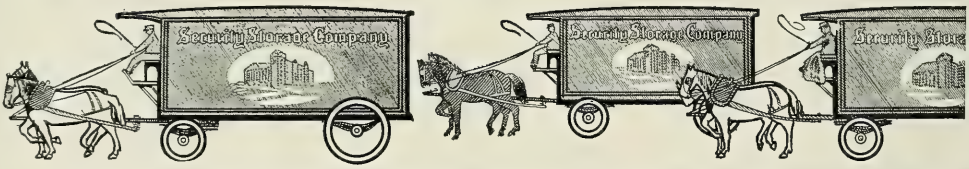

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THE NATIONAL GEOGRAPHIC MAGAZINE

WHERE EAST MEETS WEST

Visit to Picturesque Dalmatia, Montenegro and Bosnia

By Marian Cruger Coffin

With photographs by the author

THE Dalmatian coast deserves its reputation for picturesque beauty. The great limestone mountains—practically bare of vegetation and culminating in peaks over 5,000 feet high, descend to the sea in an almost unbroken line, while a continual fringe of islands forms a buffer between the coast and the Adriatic from Fiume to where the Bocche di Cattaro lies like a giant starfish spread out upon the land, cutting deep into the mountains with its great tentacles.

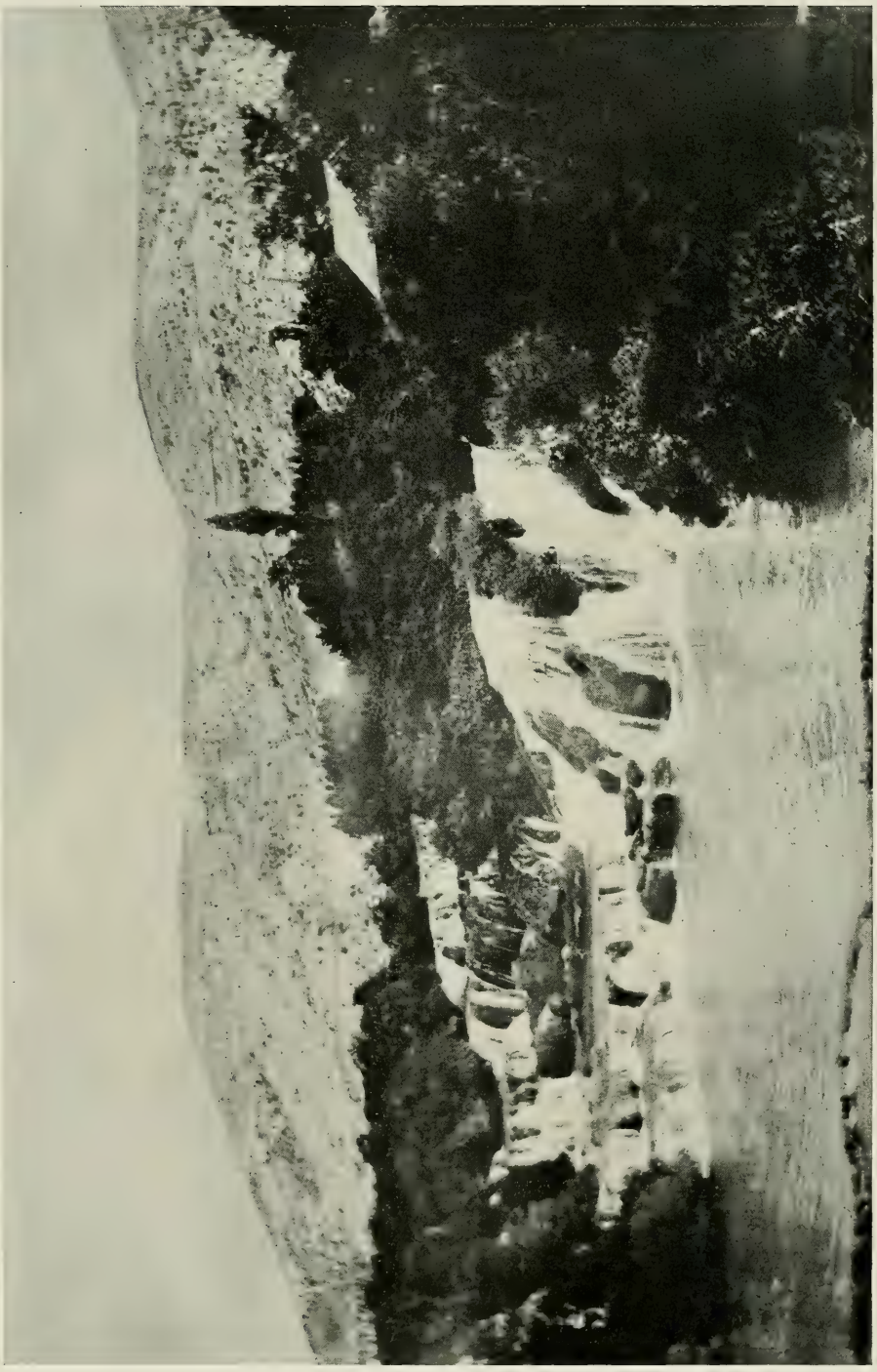
The fertile rivieras lie in nooks of the coast, sheltered from the fierce "Bora," "the wind of death," which in winter sweeps down from the mountain gorges with terrific force; these are practically the only cultivated lands in this desert country. The contrast between the island-studded sea, the rugged mountains, and the semi-tropical vegetation combined with old-world architecture of the cities affords a picture not easily forgotten.

The interior is wild, lonely, and impressive, and so barren and uninviting that except for the Falls of the Kerka it is seldom visited by the traveler. Beautiful in the extreme, the falls, or rather cascades, gain an added interest from their source being one of those underground rivers not uncommon in this part of Europe. The Kerka rises to the surface of the ground in the form of a blue-green lake, surrounded by verdure, the life and color appearing like a miracle in the midst of the desolate hills.

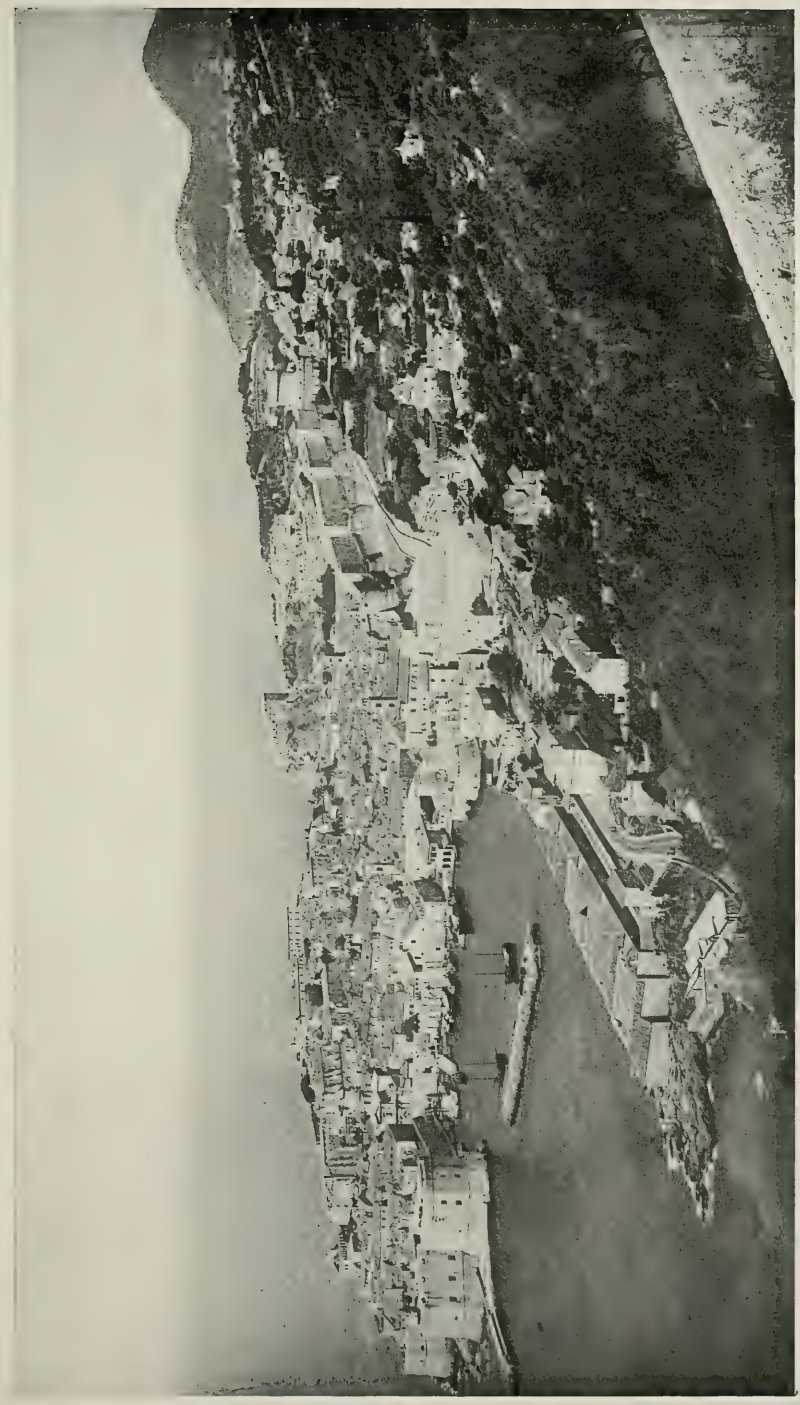
The towns of the coast are distinctive and have each their special points of interest as well as architectural beauty. Zara and Sebenico have fine Duomos, Spalato and Salona are famous for their Roman remains, and indeed much of Spalato is built within the walls of Diocletian's palace, while at Trau and Ragusa are admirable examples of medieval architecture, dating from the occupation or influence of Venice.

RAGUSA

Ragusa is easily queen of the Dalmatian cities. None can compare with her in beauty of site or architectural and historical interest. She has stood for centuries a sister republic to Venice, a bulwark in Europe against the Turk, a wise



FALLS OF THE KERKA, DALMATIA



RAGUSA, QUEEN OF DALMATIAN CITIES

and prosperous state. The great walls still inclose the town and are practically intact. They form a striking contrast to the architectural delicacy of the public buildings and palaces which rise on the steeply terraced streets, for the town is built on a narrow peninsula between the mountains and the sea. On Sundays, when the peasants from Canalle come in for church and the smart Austrian officers promenade about, the gay little city presents an almost opera bouffe aspect, with the medieval setting and the brilliant crowds flashing with color and military pomp.

The environs are most lovely, the wealth of figs, aloes, cypresses, and every sort of semi-tropical and rock-blooming plant making the surrounding country a veritable garden in spring and early summer. Lacroma and the other neighboring islands seem fairy isles, too exquisite for human habitation, but about the former hang sad memories of Prince Rudolph and Emperor Maximillian and legendary ones of Richard Coeur de Lion, for the old monastery was once a favorite resort of royalty, but has since been restored to its former uses.

The morlaks or peasants are a sturdy, independent race, mostly of Slav extraction, and distinctly well to do, especially about Spalato and Ragusa, where the soil is fertile and the crops large.

QUAINT COSTUMES IN DALMATIA

The tiny Dalmatian cap of scarlet cloth, half embroidered in black with a black tassel, is worn by the men the entire length of the coast, while no inhabitant of the Peninsula is seen without the useful bag slung over one shoulder, of woven carpet material, embroidered linen, or leather studded with nails. It serves all purposes—a cradle for the baby, a wardrobe for the family clothes, a larder for the provisions, as well as a convenient receptacle for little pigs going to market! Except for these common features the costumes vary in every district. At Zara may be seen the striking sleeveless scarlet vest ornamented with silver buttons, while about Sebenico the men affect a curious waistcoat and jacket of brown homespun, piped and trimmed with woolen fringe of bright magenta color.

In the country the women wear a heavy apron of carpet material heavily fringed and are seldom seen without a distaff in their hands as they ride or walk to market. Those from Canalle are noted for their charming costumes of embroidered linen, and they with their men folk were the only people we saw in the Balkans with adequate head covering, the wide, stiff fluted handkerchiefs of the women and the straw hats of the men protecting them from the sun. In summer the heat and glare in these shadeless lands is intense, but a handkerchief or a stiff brimless cap seems the fashion, while for dress occasions both sexes will pile one homespun garment over another, for in the Near East the more you wear the finer you are!

AN UNCONQUERED RACE

But if the people and the scenery of Dalmatia are interesting, those of Montenegro are infinitely more so. A land of mountains, apparently without valleys, and almost destitute of vegetation, Montenegro seems to have emerged out of a chaos of the gods to be primeval rib of the world. And, in keeping with the country, is the proud and independent character of this race, who have retreated step by step before the Turk from the fat lands they once held, preferring freedom in their rocky fastnesses to soft living under the yoke of Islam. And it must be remembered to their everlasting credit that they not only remained free when the other Slav peoples as well as the Greek, Albanian, and Bulgar fell before the power of the Turk, but that they maintained their independence when all Europe, to the gates of Vienna, trembled before the hosts of the Crescent.

Disembarking at Cattaro (lying baking in the August sun) after a wonderful sail through the tortuous Bocche di Cattaro or "mouths of Cattaro," we took the waiting carriage and started on the

SKETCH MAP OF EAST COAST OF ADRIATIC SEA

climb up the mountain wall to Montenegro or the "Black Mountain." Cattaro is the natural port for Montenegro, but is jealously guarded by Austria, and it was not until we had ascended for more than an hour that we came to the striped black and yellow post that marks the boundary. Our driver stopped to water the horses, to collect his revolver (left at a wayside hut, as it is forbidden to carry weapons over the border), and pointed to his native crags above, saying proudly, "Crnagora." We turned for a last look at the superb view spread out below us, the sea shimmering in the distance, and at our feet the land-locked Bocche guarded by the mighty Orjen and the peaks of Herzogovina to the north and west.

We reached Njegus by the waning light. This our first Montenegrin town was the birthplace of the prince, and is a village with one wide street and small, low stone houses. Wherever there is sufficient space little patches of vegetables are cultivated in a series of stone terraces, built to keep the precious soil from being swept away by the heavy rains. These little garden plats give a curiously checker-board aspect to the valleys and hillsides in contrast to the wastes of rocks above.

From Njegus we climbed steadily up through the same dreary crags, even more solitary and impressive in the moonlight, and reached the top of the pass (3,500 feet), from which Cettinje can be seen in the daylight. Scarce a trace of habi-

PEASANT CARDING, DALMATIA

WOMEN NEAR SPALATO, DALMATIA
Note the heavy brocaded apron (see page 312)

TWO BEAUX IN "THE BOCCHE"

AT ZARA, DALMATIA

A WAYSIDE FOUNTAIN, INTERIOR DALMATIA

tation was to be seen. We stopped to water the horses at a wayside hut, wild young girls shyly waited on us, then passed a solitary dwelling and heard the minor wail of the one-stringed gusle (the national musical instrument) and a strong bass voice singing one of the old ballads, probably about the Tzar Lazar and the field of Kosovo, or possibly of the doings of the singer's own immediate forefathers in a border fray against the hated Albanians.

THE CAPITAL OF MONTENEGRO

The Europe we know is left far behind. We drop suddenly from the complexities of modern life into the peace and simplicity of the patriarchal system, still in force in this strange little state where east and west meet so subtly. Here a man's life is of small account, but he will hold his honor above all earthly price, while the ambition of every boy is to be a warrior and rival the deeds of the heroes of old.

Twenty years ago Cettinje was a collection of hovels. Now it is a clean, neat little town with wide streets and low stone houses roofed with red tile. There are no attempts at architectural decoration—all is plain and bare and seems to have sprung from the very soil of the mountain-locked plain. It has been called a kindergarten capital, and though but a village in size, conducts itself with the importance befitting the center of the country. It boasts a theater and the Prince's very modest palace, while the large, pretentious embassies of Austria and Russia guard opposite ends of the town like two great bloodhounds waiting to pounce on their prey.

Sights, in the strict sense of the word, there are none, but one may entertain oneself by bargaining in the market with the handsome girls for colored strips of embroidery with which they trim their blouses, chatting with some one who has a word or two of German or Italian, admiring the medals of the older men gained in the last war with the Turks (proudly shown off by the younger men, the wearers modestly deprecating their own glory), taking a friendly cup of coffee with the tailor who is making one a national costume, or waiting for a glimpse of some member of the royal family to pass by, possibly the Prince himself.

But the amusement of all others that never palled on us was watching this handsome race airing their finery in the open streets of Cettinje. The national costume seems designed to show off the grace and dignity inherent in even the humblest Montenegrin—crimson and gold sparkle in the sunshine, in dazzling contrast to the somber tints of the encircling mountains, real gold, too, which is elaborately worked in the garment by hand. From the royal family down, the men wear a long, wide-skirted coat of light grey, white, robin's egg blue, or dark green cloth, embroidered in gold, or dark red, open wide in front over a crimson waistcoat heavily decorated in gold, and confined about the waist by a broad sash of plaid silk. The belt is stuck full of weapons, knives, pistols, etc., for our friend considers his toilette incomplete without such accessories, and indeed one's eyes become so accustomed to seeing every man a walking arsenal that on returning to work-a-day Europe people look strangely undressed! Dark blue breeches, baggy to the knee, with the leg either incased in white homespun and low string shoes on the feet, this is thoroughly characteristic, or if the wearer be a bit of a dandy a pair of high black riding boots will be worn instead; a cane for dress occasions and the cocky stiff-brimmed cap complete the costume.

A tale hangs by the cap. The Montenegrins are a conservative people and, like all the Serbs of the Balkans, look back to the days of the great Servian Empire when the Slavs held most of the Peninsula. The highest point of glory was reached under Stephen Dushan, 1337-1356, who planned to keep the Turk out of Europe, but who unfortunately died at the height of his career. In 1389 the different Slav peoples made their last

united stand under Tzar Lazar Gubljanovich on the plain of Kosovo. The day was at first with Tsar Lazar, but, as usual in the Peninsula, jealousies prevented a concerted action and he was betrayed by his son in law, Vuk Brankovich, who coveted the crown. He deserted to the enemy with 12,000 followers, a frightful slaughter ensued, and the Balkans fell to the invader. This fateful 15th of June is a day of mourning throughout Serb lands and the Montenegrin cap is worn in commemoration—the black is for mourning, and the red-centered crown for the blood shed on the field of Kosovo. A semicircle of gilt braid encloses the Prince's initials H. I., the circle typifying the rainbow of hope that the Turk will be driven from Europe and the great Servian Empire again established.

A PROUD AND HANDSOME RACE

The dress of the women is not so gaudy as that of the men, though very graceful. Like their brothers, they wear the national cap without the gold braid, the married women being distinguished by a black lace veil falling behind. The hair is parted and the mass of heavy braids forms a coronet for the well-carried heads. They wear a soft, silky blouse with open sleeves and trimmed with strips of delicate embroidery, a band of which forms the low collar, then a red or black velveteen bolero heavily braided in gold, and over all a semi-fitting, open, sleeveless coat reaching to the knees of the same delicate shades as worn by the men.

It would be hard to find a handsomer race; the men, seldom under six feet, strut about like war lords. Their only business in life for generations has been to protect their families from Turkish raids when not engaged in actual warfare. Consequently most of the hard work has fallen to the women's share, which they cheerfully perform, often carrying heavy loads, such as great blocks of ice, from the higher mountains down to the towns. Such labor and the hard conditions of life age them early, but when young the girls are really beautiful, with noble, Madonna-like faces; the type is rather mixed in coloring, neither light nor dark. We saw many fine gray eyes and especially noticed a lovely shade of ruddy gold hair.

Traveling in Montenegro is delightfully simple; there are no trains and only one carriage road in and out of Cettinje; you either go by carriage or you take a pack pony and scramble over the mountain tracks. It is said that Prince Nickola wishes to make Nikshitz his capital, as being more in the center of the principality; the one road from Cettinje connects with it via Podgoritza, but it is doubtful if the scheme will be carried through, as Cettinje is considered by the representatives of the Powers to be the "jumping-off place," and certainly Nikshitz would be much less accessible.

Delightful as were the days at Cettinje, the beyond was ever calling, and it seemed a pity when so near the Sultan's domains not to drop over the border into Albania, the most northwesterly *vilayet* of the Empire, and see not only a bit of this out-of-the-way province, but the Albanians, who are the wildest people left in Europe, in their own country and in their own capital. Our friends shook their heads dubiously and advised us not to go. "Why is there trouble?" "Where there are Albanians there is always trouble. The ladies had best stay with us; they can travel safely all over Montenegro, but the Albanians are a bad lot." However, we had seen enough of the edge of the Eastern question to know that every man's hand is turned against his neighbor, and even now the Montenegrin cannot get over the wars, cruelties, and reprisals of his blood enemy of hundreds of years.

We decided that the Albanian was probably not so black as he was painted and left Cettinje early one morning en route for his capital of Scodra. After leaving the town the road rose steadily, and when we reached the top of the pass we caught our breaths at the beauty of the view spread out before us—peak after

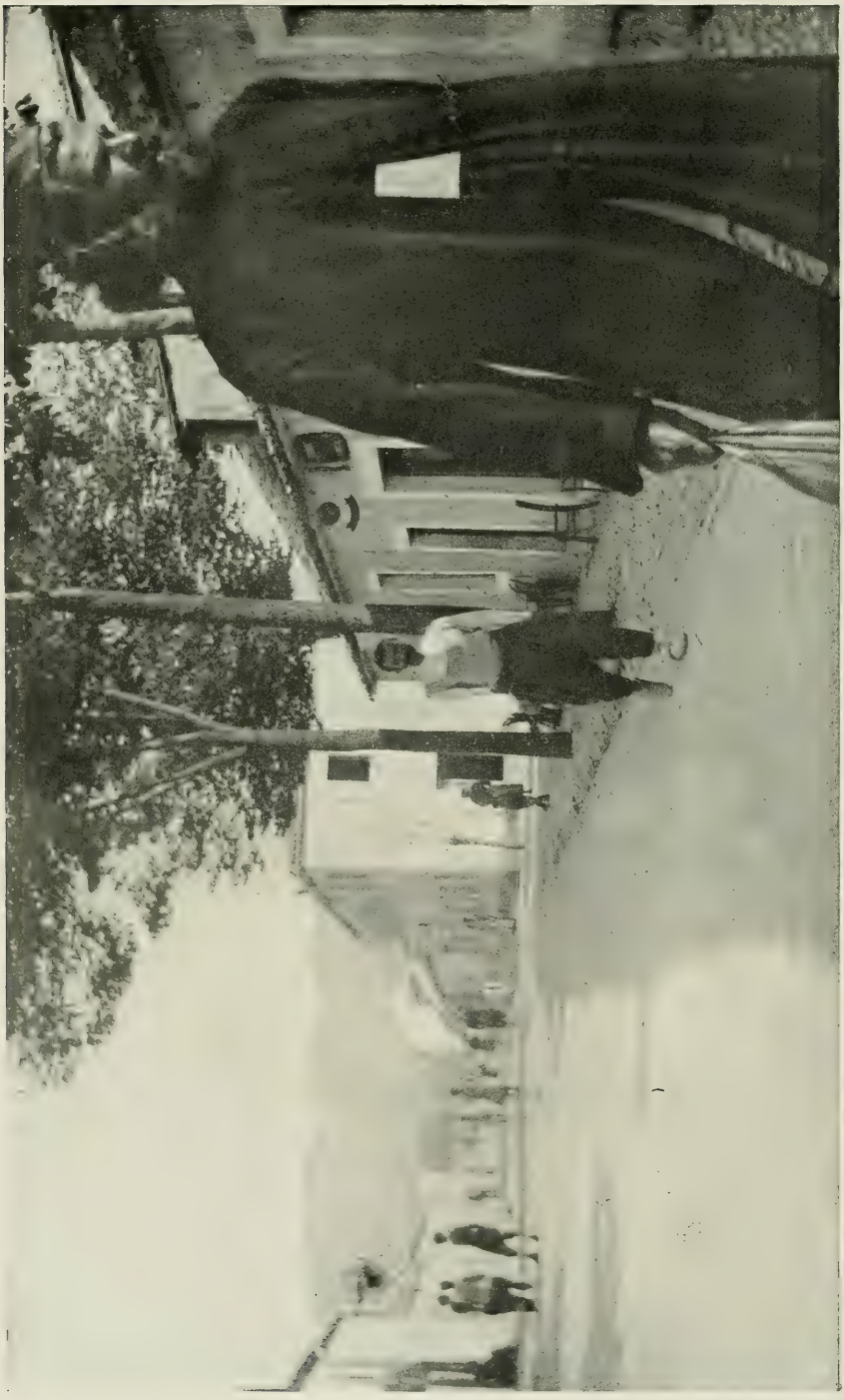
BOCCHE DI CATTARO FROM THE MOUNTAIN ROAD TO THE CAPITAL OF MONTENEGRO
Note the winding road climbing the mountain on the left

SAINT SAVINA, A GREEK ORTHODOX MONASTERY IN THE "BOCCHE"

A MONTENEGRIN DANDY

A MONTENEGRIN OFFICIAL

A MONTENEGRIN BRIDE



MAIN STREET, CETTINJE, MONTENEGRO

peak rose majestically above, far below lay a green valley with its tiny village and the long, lonely, opal lake of Scodra deep set in its barren hills, while the grim Albanian mountains showed blue and hazy in the distance.

THE LAKE OF SCODRA

We rattled down to Riejka, the village on the lake, so named from Ivan Beg Crnoievich (riejka means a stream), who ruled in the latter half of the fifteenth century and had his capital in this vicinity. These were among the darkest years for the Montenegrins, and Ivan was forced to cede the rich plains of the Zeta to the Turks and was driven to the mountain fastnesses and there founded Cettinje in 1484. He built a castle above Riejka to fortify his new frontier and swore to hold the Black Mountain at any price. A wise as well as a warlike ruler, he founded a monastery and sent for a printing press from Venice, but twenty years after the first book was printed in London by Caxton! Popular tradition says that he but sleeps, and will one day awake to lead his people in their hour of need.

But more pressing than past history was the question of present transport, so we hastened to make inquiries if the boat was running on the lake. "No; it was broken." "What shall we do?" "If we turn back or wait we shall miss the Wednesday market in Scodra which we have come so far to see." Then being told that if enough passengers turned up to make it worth while a small tug would be run instead, we embarked in a row-boat to reconnoiter. A small pink tug presented itself, and also fortunately two Italian gentlemen and a number of peasants, so the list being complete we foreigners managed to stow ourselves in front, the peasants aft, and the little boat glided out on the pretty tortuous stream through masses of lilies and water reeds, gallantly trying to bar our progress into this lovely solitary lake. Great herons and spoonbills and other water fowl took our passing through their favorite haunts quite philosophically, too indifferent to even flop away. We twisted and turned for some time, and after passing a fortified island emerged into the open lake—Montenegro towered behind and the so-called accursed mountains of Albania rose in unreal cloudlike masses in the far distance.

Stops were made at Virbazar and Plaunitza to take passengers on and off; at the former place we persuaded the captain to take us ashore with him to pick up the mail, for which he cheerfully announced he might have to wait at least four hours! So, with the captain and mate, we scrambled into a dugout and were rowed by a sheep-nosed, raucous-voiced boy up another little creek to the charmingly situated town, which was quite overcome with astonishment at seeing us, Europeans, especially women, being rare.

We sat in front of the little drink shop under the shade of fine old plain trees, with our tea basket, an infinite delight and amusement to the natives. Captain and mate made no bones about drinking out of glasses encrusted with grime, probably being used to Montenegrin customs, but the little maid who served us evidently thought we were accustomed to better things and politely gave the glasses a wipe with still grimier fingers!

The town affords some attractive views, while old fortifications on the hill looked worth exploring, but the sun beat down mercilessly and we succumbed to the fascinations of shopping, assisted by the entire population, with much advice and many kindly pats on the back when a certain article was tried on (in the street, as the shop had become too congested by onlookers) and considered becoming.

So far the transactions had been carried on by means of signs, but now the crowd made way for a handsome ragged lad with an open face, evidently a traveler, with a sturdy staff, and all his worldly possessions tied up in a handkerchief. He knew a few words of German which he had learned from his father, who "had seen the world" (he had been

in the Austrian provinces); he, too, was going abroad to seek his fortune, *where* seemed immaterial. "He feared he might find many bad people after leaving Montenegro, as he had been told that there were many wicked people in other lands who would not give food and shelter to wayfarers." He proudly refused money and even cigarettes for his interpreting, but wistfully asked "were the Herrschaften going his way, for in that case they could help him in their country as he had helped them in his." The diligence came in and he waived us a sad farewell as he drove off. Poor boy; we hoped the great world would reward his brave trust.

The mail came at last, so we reëmbarked to continue our trip. The lake opened, the same stone hills continued to enclose it, without a sign of habitation the entire length of forty-odd miles. The sun set, casting glorious flame-colored lights on mountain and water; the moon rose, and we steamed past the Sultan's one decrepit war ship flying the Crescent of Islam and anchored off Scodra or Scutari-Albanese, as it is called on our maps, after a sixteen-hour trip. Great canoes came out to the tug, our persons and belongings were fought over, and, at the risk of being dumped in the lake, we were deposited on extremely topply chairs and in the bottom of the canoe and taken ashore. All was darkness, noise, and confusion in the custom-house. We smuggled the kodak and a couple of books, and by giving a liberal backsheesh got through at once and were conducted by our friend the captain to the one inn where it is possible to stay.

THE ALBANIANS

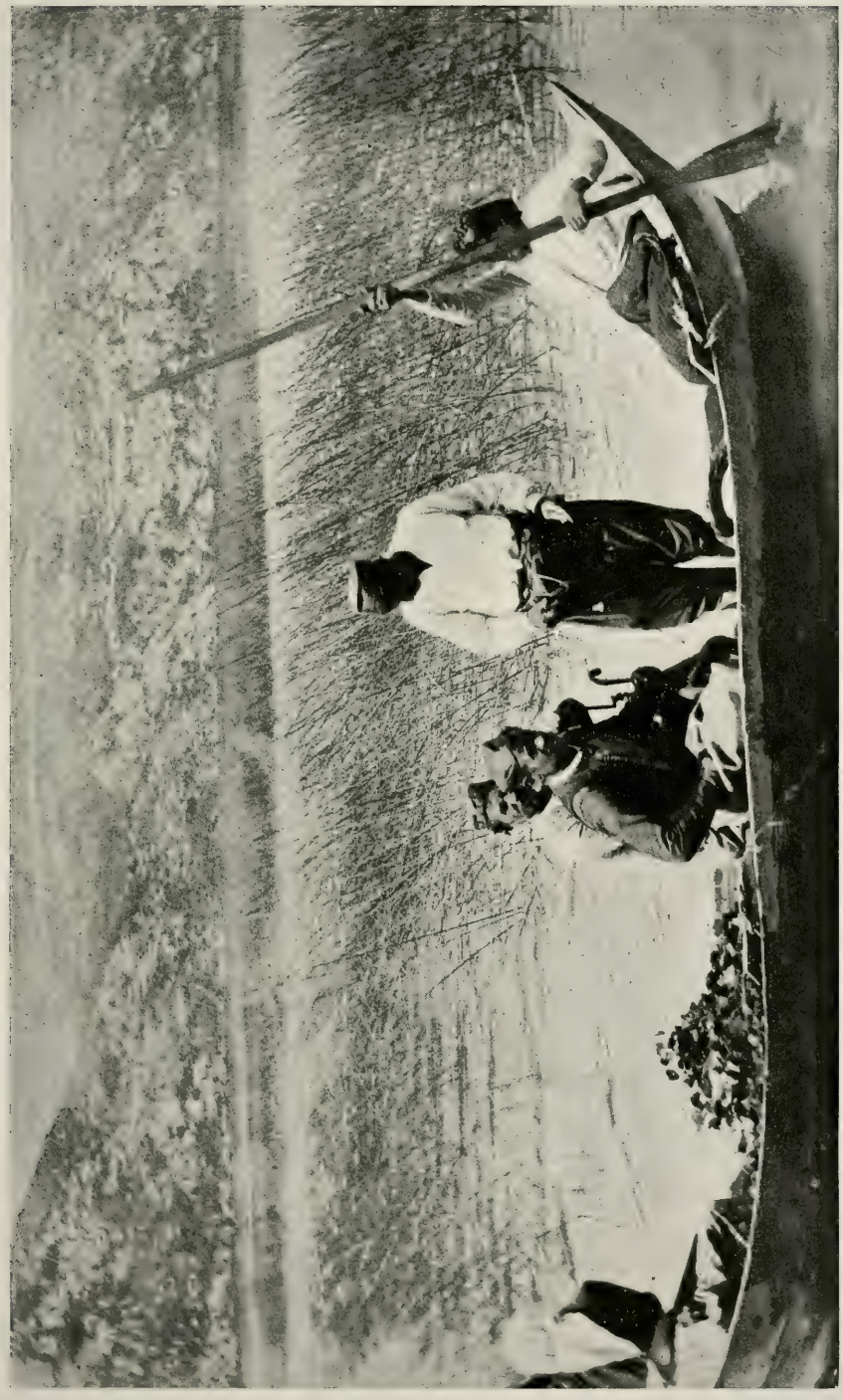
Scodra is situated at the end of the lake, in the midst of a wide plain that late in August was burned dust dry. The town has a population of some 40,000 inhabitants, and is considered by the Albanian the finest city in the world. It is dirty, dingy, thoroughly Eastern, and possesses a fascination all its own, for here we are in a land and among a people whose development was arrested in the middle ages and who have not progressed in ideas, customs, or morals from that time. Here there is no trace of the West or modern civilization such as one comes upon in striking contrast to Old World ways in the other Balkan states. The houses are concealed behind 10-foot walls, with overhanging eaves of brown tiles and picturesque blue or green latticed windows; few houses but have a garden, the vines and trees peeping gracefully over the walls. A few mosques and minarets appear in the distance.

The Albanians are recognized to be the descendants of the ancient inhabitants of the Peninsula, who were here before the Greeks or Romans, and are not allied to the other Balkan peoples; civilization and empires have swept over them, and they have gone on in their own savage way, accepting a nominal ruler, but a nominal only. They speak a language that is not written. Their code of life and morals is thoroughly medieval, and their proud boast is that they have never betrayed a friend or spared an enemy. Fighting is the breath of their nostrils, and for this reason they have been extremely useful to the Sultan, and by fighting in his armies have purchased immunity from interference and taxation at home. If you ask about the openly smuggled tobacco in Scodra Bazar you will be told, "We Albanians do not chose to pay taxes; why should we?"

Not only a brave but an able man, the Albanian is quick to learn when given the opportunity, and is keen and successful in business when able to escape the blight of the Turk, which is keeping him an untutored savage.

The Bazar is the greatest attraction in Scodra. It lies down by the river, a labyrinth of narrow, ill-paved lanes with gutters down the middle, where the pack animals walk, the spaces between the tiny booths being often not more than 6 feet wide. Fascinating at all times, the scene on market days is indescribable—a mass of glaring barbaric color, the alleys throbbing with a life that our ancestors, too, must have known in the glittering, squalid middle ages.

Here the streets are each given over to



CANOE ON THE LAKE OF SCODRA

ALBANIAN TRIBESMEN IN SCODRA BAZAR (SEE PAGE 328)

a separate occupation, one to the bakers, one to the butchers, a third to the gunsmiths, a popular booth, especially with the mountain men. Petticoat lane displays the discarded finery of the harem, sometimes, too, fine embroideries and marvelously tinted brocades. The harness shops are gay with all sorts of colored leather trappings and bead headstalls with amulets to keep the evil eye from the pack ponies. Crude red and green cradles and gaudily painted chests for the ladies, in which to keep their finery, are sold at the carpenter's. The tinsmiths ply a busy trade in curiously wrought metal belts, while busier and more popular than all is the inevitable coffee booth.

MEDIEVAL COSTUMES AT SCODRA

And the motley crowd who jostle each other in and out of the narrow ways! A Mohammedan Beg swaggers by in the cumberous fustinella, the plaited white shirt worn by the Greeks, but seen in its greatest glory on the Albanians. Here a group of wild men and women from the mountains, the former stalking stealthily in front, their ever-searching eyes on the lookout for the enemy who may be in hiding, the latter carrying heavy loads on their shoulders, possibly for a walk of ten hours!

Their costume is one of the most curious in existence. That of the men consists of white homespun, medieval-looking leg gear, heavily striped and braided in black; an open vest, the front braided and cut in zigzags, and over this a black sleeveless wool jacket with a square fringed collar, the whole topped by a white fez. This black jacket is worn for George Kastoriot or Skenderbeg, one of the few great men the country has produced. He gathered the tribes together and held all the land against the Turks till he was killed, in 1467, and his people still cherish his memory so dearly that they wear mourning for him. The women wear short, very stiff skirts of the same homespun, white and black alternating in the stripes, waistcoat and long white coats of the same material ornamented in red and blue.

But older still is the dress of the town men and boys of the poorer classes—a white tunic and drawers tied about the waist with a red sash and topped with a fez. This without the fez is the costume of the barbarians on the Greek and Roman vases. If this is the oldest, the palm for the ugliest is easily borne off by the well-to-do Christian women. The wearer is hardly able to get along at all in her high-heeled shoes and with the enormous weight of the material used in her trousers, which she has to hold up with both hands, and then is only able to waddle. These women go veiled in the streets and swathe themselves in a shapeless scarlet coat with a square collar pinned up to the head, the whole braided in black. Their husbands and sons affect jaunty jackets of dark red so heavily embroidered as to appear black, but then everybody of importance is brave with embroidery in Scodra and wears garments that are marvels of the art of needlework, with the comforting conviction that the fashions will never change and that clothes will last a lifetime and can then be passed on to the servants and dependents of the family.

At night Scodra was uncanny; it is unsafe even for the natives to venture out after dark. Few houses showed a light, and all was silent and mysterious. The last night of our stay we were aroused towards dawn by hearing a stray shot or two, which soon grew into a perfect fusillade, a bell tolled, and as the sun rose the Sultan's unkempt troops turned out, each munching his ration of dry bread as he rode (all hunched up on the small pony) after the possible malefactors. We thought the massacre of which the town lives in ever present dread had really begun, and we were greatly relieved to learn that the commotion was only caused by robbers in the ward.

We tore ourselves regretfully from barbaric Scodra, so brilliant by day, so depressing by night, for much still lay before us, so back across the lake we went, and were welcomed by our friends in Cettinje as if from out of the lion's den. With many promises to return

another year we retraced our steps to Ragusa, there to repair the ravages travel had made on ourselves and our linen, and enjoy the luxuries of civilization before starting again for the interior.

IN HERZEGOVINA

After Albania, a Turkish province administered, or rather not administered, by the Turk, we were forcibly struck with the prosperous appearance of the people of Herzegovina and Bosnia, Turkish possessions until 1878, when they were, after the revolt, handed over to Austria to be governed. The conditions were said to be as bad then as they are now, in parts of the Sultan's dominions, where there is no safety for life or property. Today Austria administers the country (under the nominal control of the Porte) wisely and paternally, regarding the religious and other customs of the people, with the result that the Moslems and Christians live side by side in the greatest peace and amity.

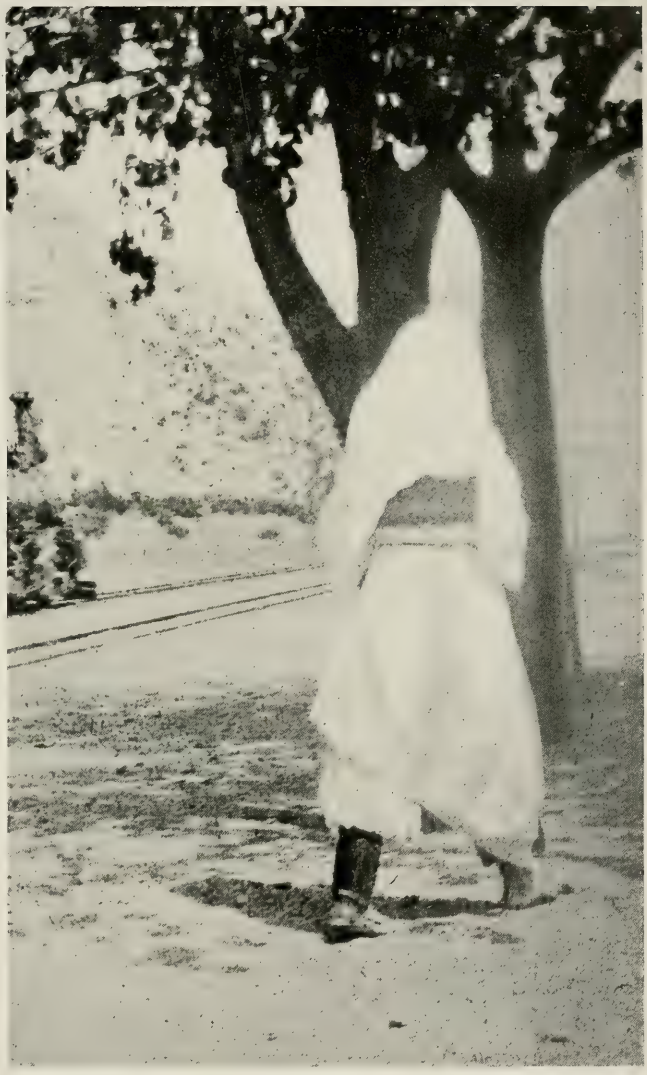
We took the railroad, which has been recently constructed, from Ragusa to Mostar. Soon the tropical vegetation of the coast had been left behind, the train crawling steadily up through grand mountain scenery. We made several stops, when wild women from the hills of Herzegovina, in white linen trousers and tunics, their legs incased in top boots, peered shyly at us, afraid to meet our eyes, much less face the camera. We passed several train-loads of peasants traveling fourth class in vans marked "12 horses or 30 people," and drew up at the capital of Herzegovina, Mostar.

The town is thoroughly Oriental, beautifully situated on both sides of the rapidly flowing Narenta, with many minarets picturesquely breaking the sky line. The two quarters of the city are connected by a superb old stone bridge, with a span of a hundred feet and over 60 feet above the stream. Tradition attributes it to the Romans (though it was probably built by one of the early Sultans), and also says that great difficulty was found in building the foundations, until some one had the happy inspiration of burying two lovers beneath the piers, after which all went well.

Leaving Mostar, we entered the great defile of the Narenta, a wild and rocky gorge, had a glimpse of the Prenj Mountains towering to the right, reached the top of the Ivan Plana, the watershed between the Black Sea and the Adriatic, passed through a tunnel, and emerged into Bosnia proper. As we descended toward Sarajevo the country began to assume an entirely different aspect to anything else we had seen in the Peninsula; the wild gorges and rocky peaks gave place to fertile river beds and beautifully wooded hills, the little villages being very quaint and distinctive. The houses have extremely steep-pitched, shingled roofs and are built, even the modern ones, without chimneys, the smoke escaping as best it can.

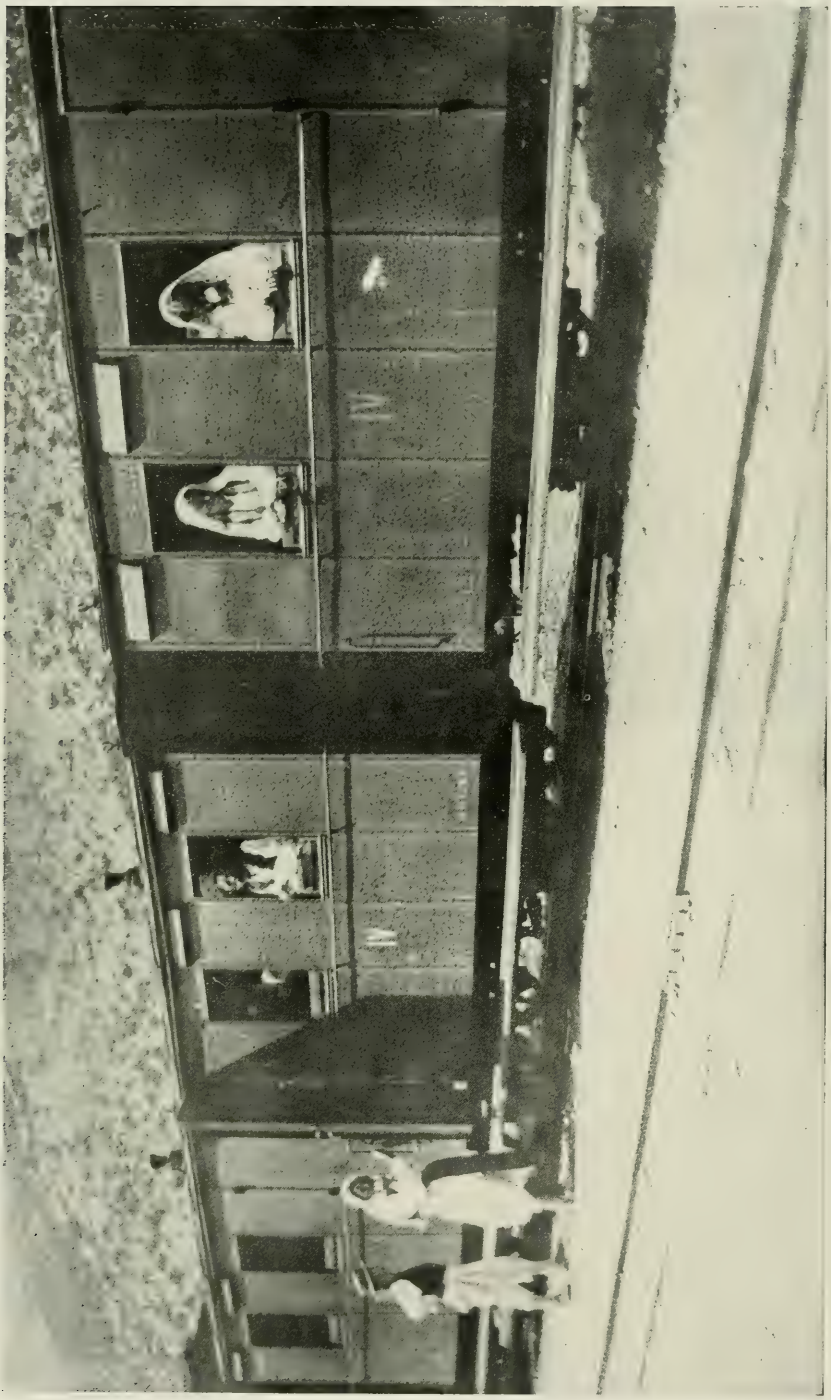
Sarajevo, "the Damascus of the North," so called from the number and importance of its mosques, is a most curious mixture of a European and an Oriental city. It lies in the wide valley, on both sides of the Miljacka. The Austrian quarters are situated along the river bank, while the native houses straggle picturesquely up the sides of the inclosing hills, and the population is as mixed as the architecture. As the largest city in the province, it is an important military post; the streets are full of smart officers and their wives, as well as the officials of the Austrian government, while the native population is varied and includes not only the Greek and Catholic Christians, the Moslem Bosnians, some gipsies, a few Turks, and people from the neighboring states, but quite a colony of the Jews who are the direct descendants of those who, strangely enough, found refuge in Bosnia at the time of the Spanish Inquisition, and who still speak Spanish and are called Spaniards. Friday, Saturday, and Sunday are respectively the Moslem, Jewish, and Christian Sabbaths, when the town is less lively, but on other days there is always something doing, especially in the Bazar,

where the different types and costumes are seen to the best advantage. Unfortunately this trading center is now almost entirely given up to the sale of cheap Austrian manufactured goods; this is particularly disappointing, as the Bosnian is a born craftsman, combining great taste in color and design with dexterity in handling his material. The government has opened schools for both sexes for training in the manufacture of textiles, rugs, inlay and metal work, but to us, watching the streets in the Bazar, where the cross-legged, turbaned men were at work on all sorts of leather, was by far more fascinating. They fashion this material of every conceivable shade into bags, belts, harness, and shoes of every size and for every national costume, from the high, loose, lemon-tinted boot the Turkish women wear in the street to the clumsy, elaborate shoe for the countryman, with no heels and a turned-up, pointed toe, most craftily worked and ornamented in another colored leather.



COUNTRY WOMAN, HERZEGOVINA (SEE PAGE 332)

We became quite chummy with a fair-haired, blue-eyed young Bosnian whom we met in the Bazar, and who called himself a "Turk," as do so many of the Moslems. To our surprise he offered to show us the interior of the Husef Beg Mosque, and he seemed much pleased when we admired its lofty proportions. He also took us to a coffee-house or "kavanna," patronized entirely by natives—really a garden inclosed with a lattice fence, the humbler guests sitting on wooden benches under the trees, the more exalted in pretty, thatched-roofed summer-houses on each side. The coffee booth was aglow with shining brass utensils and bright charcoal fire. Twinkling lights brought out the dark, rich dress of the well-to-do town Moslems, in fez, slippers, black silk trousers, and jaunty little jackets embroidered in gold, who were sipping the delicious coffee,



HERZEGOVINIAN PEASANTS TRAVELING FOURTH CLASS
These cars are marked "12 horses or 30 people"

SARAJEVO PACK PONIES EN ROUTE TO MARKET

smoking cigarettes, and listening with great contentment to wild gipsy music or monotonous ballads of long dead kings.

Coffee and cigarettes, everywhere good and cheap, seem to be the chief articles of subsistence of the Bosnians, who consume an incredible amount of both (we were told some of the men limited themselves to 100 each per day), and though we have watched them at all hours at work in their little open-fronted shops, we rarely saw them eat any solid food!

A FEW DAYS IN BOSNIA

But to see the country as it was in the old, unregenerate days before the Austrian occupation, we went to Jayce. This little town now lies off the beaten track, but was once the center of the important Banyat of Jayce, and is today the prettiest place imaginable, with its quaint shingled or stucco painted houses, mosques, and fountains. The surrounding country is lovely, the falls, just above the town, where the Pliva, flowing from the lake of Jesero, precipitates itself into the Vrbas below in a leap of a hundred feet, being really remarkable. We drove one morning to Jesero, not far away, on the lake of the same name, between deeply wooded hills, which afford good cover to all sorts of game, while on the

HERZEGOVINIAN WOMEN IN THE STREETS OF SAINT SAVINA

MOSLEM WOMAN, MOSTAR, HERZEGOVINA

lake the wild ducks were so tame that they swam almost within reach. The village, set in its mass of verdure, suggested a scene in Surrey, but the minarets, the veiled women, and the little girls, with their hair and hands dyed with the all-popular henna, reminded us that we were still in the East.

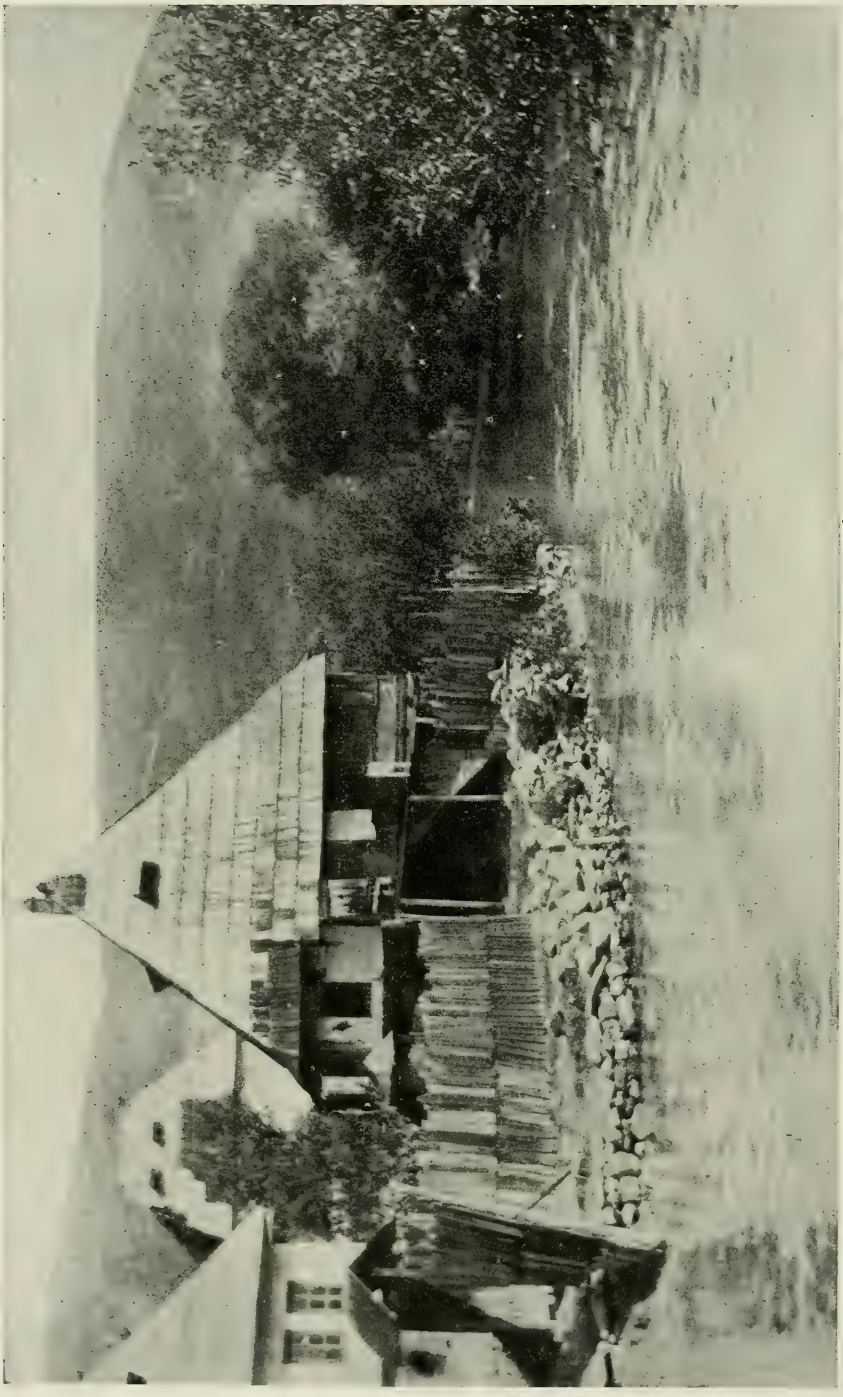
Market day brought into the open market place country people from all the surrounding farms and hills. Every one had something to sell and to buy. The pottery man's wares, designed for household utensils, were popular with the housewives and gave a lovely splash of green and gold to that part of the square. All sorts of grain and seeds were for sale in loosely woven baskets, while the sheep and goats had an entire plateau to themselves. Several itinerant traders were doing a lively business in bright glass beads among the younger women, who make them into belts and other dress trimmings, while strung on wire they were bought in the form of bracelets and necklaces.

The peasants were quite as much interested in us as we were in their costumes, and much friendliness prevailed, smiles and pats on the shoulder taking the place of words. Screwing up our courage, we tackled a dark young beauty, smoking a cigarette with a charmingly nonchalant air, and asked her if she would be willing to sell her belt and apron. She was at first too astonished and amused to answer, but finally coyly consented. A friend came up to see what was happening, this one a handsome blonde, her husband in tow. She was also willing to sell any part of her costume, and promptly began such an alarming unfastening that we hastily suggested the garments could be delivered later.

Soon the fame of the crazy "Herrschaften," who were willing to pay good money for old clothes, spread through the country-side, and before long the space outside the inn was crowded with what the distracted proprietor called "ein Jahrmarkt." Crowds of peasants were displaying their wares and good naturedly trying to oust each other, while one woman, we were sure, was offering her baby as an extra inducement to the collector, as we called the gentleman of our party. Aside from the amusement, it was rather pathetic to see how much a little ready money meant for these hard-working, honest souls, who would tramp hours with bits of their finery, embroidered garments, and fine old brass ornaments to sell them to us for a few kronen.

On a showery morning we drove off from Jayce, our plunder following in a second carriage; our drivers, two gay young Moslems, who entertained us vastly with their wild bursts of song, by chaffing every one on the road, and by flirting outrageously with all the peasant women we met. The way lay through magnificent scenery, past scattered settlements and lonely haus, where we always halted for the inevitable coffee, the charm of the East lying over all until we drove into the district town of Banjaluka. Here, after a night spent in lodgings off the stable yard, the inn being full, we started by rail back to commonplace Europe. In a few hours we were out of Bosnia. The East, its scenery, mystery, and costumes were left behind; the crown lands of Hungary through which we passed seemed worthless in comparison and the every-day life to which we were returning remarkably tame.

HERZEGOVINIANS AND BOSNIANS AT A FIESTA



BOSNIAN HOUSES, YESERO

YESERO, BOSNIA

JAYCE, BOSNIA: A GREEK ORTHODOX BEAUTY

JAYCE, BOSNIA, TURKISH FOUNTAIN

SHEEP AND GOATS, JAYCE

AN AMERICAN FABLE*

By Gifford Pinchot

Chief of the United States Forest Service

THE conservation of our natural resources is a subject which has had little attention in the past; but it is so simple, so elementary, that it might almost be told in words like those of the old fairy tales that we all loved when we were boys and girls. It might run in this way:

Once upon a time there was a young man who had been given a great property in a distant region, and left home to take possession of it. When he reached his property he first made himself acquainted with it. As he explored it and studied its value he began to think how he would make his living out of it. The problem was not a hard one.

He found that his property was wonderfully rich, and supplied his needs at the cost of far less exertion than he would have had to make at home—a fair land, well watered, well timbered, and abounding in game and fruits, with broad meadows for cattle and horses and sheep, and with no small store of rare and curious minerals, and an outcrop of excellent coal. Life was easy, and he lived lavishly and joyously at first, after the initial hard work of moving in and building his house and raising his first crops was over. He had far more land than he could use, far more game; and what he lacked he was able to buy from home with furs, with timber, with minerals, and with the surplus of his crops.

By and by he saw and liked a girl and finally married her. Together they prospered on their property, which seemed too rich to make it necessary for them to trouble about the future. Game was still plentiful, though less so than at first; the timber, though growing less, was still abundant enough to last longer than they could hope to live; by breaking new land they could always count on marvelous crops; the coal was a little harder to get at, but still close to the surface, and besides the man only dug out the easiest, and when the earth began to cave in started again at a new place. His stock, pastured on the meadows, had trampled out some grass, but there was still no lack. That some day strangers would possess their property when they had done with it, and find it somewhat run down, did not trouble these two good people at all.

But children had come to them with the years, and by and by these children began to grow up. Then the point of view of the man and his wife changed. They wanted to see their sons and daughters provided for and settled on their home property, and they began to see that what was enough and to spare for them would not support all their children in the same comfort unless they themselves used it with better foresight. Through thinking of their children they were led to live more in the future.

They looked forward and said to themselves, "Not only must we meet our own needs from this property, but we must see to it that our children come in for their fair share of it, so that after a while the blessedness we have had here may be carried on to them." So the family established itself. The man became respected and his children grew up around him; and when in the fulness of time he passed away and his children took the place in which he had stood, because of his foresight and care, they enjoyed the same kind of prosperity he had enjoyed.

It is a perfectly simple story; we all of us can name scores of men who have done this same thing. The men and the women who do it are not famous, are not regarded as remarkable in any way;

* An address to the National Geographic Society, January 31, 1908.

they are simply good, every-day, average citizens, who are carrying out the duties of the average citizen.

THE STORY OF OUR NATION

Now once upon a time there was a young nation which left its home and moved on to a new continent. As soon as the people who formed the first settlements began to examine the value and condition of this new continent, they found it marvelously rich in every possible resource. The forests were so vast that they were not a blessing in the early days, but a hindrance. The soil was so rich and there was so much of it that they were able at first only to scratch the edges of their great property. It was quite plain to these people in the early times that however much they might cover, however much they might waste, there was going to be plenty left. They found wonderfully rich deposits of ore, great oil fields, and vast stretches of the richest bituminous and anthracite coal lands; noble rivers making fertile broad expanses of meadow, rich alluvial prairies, great plains covered with countless herds of buffalo and antelope, mountains in the west filled with minerals, and on both coasts opportunities richer than any nation had ever found elsewhere before.

They entered into this vast possession and began to use it. They did not need to think much about how they used their coal, or oil, or timber, or water—it would last—and they began to encroach on the supply with freedom and in confidence that there would always be plenty. The only word with which they described what they had, when they talked about it, was the word inexhaustible.

Let us see for a moment what the course of development of this young nation was. First of all they needed men and women to settle on the land and bring up children and have a stake in the country. That was absolutely necessary before there could develop the great nation which some of them saw ahead. As the population spread, there arose a need that great systems of transportation should be built to knit the country together and provide for the interchange of its products. These railroads called for iron, coal, and timber in great quantities. Then began an unprecedented demand upon the forests. Not only could they not build those transcontinental railroad lines without millions upon millions of railroad ties cut from the forests of the country, but they could not mine the iron and coal except as the forests gave them the means of timbering their mines, transporting the ore, and disposing of the finished product. The whole civilization which they built up was conditioned on iron, coal, and timber.

As they developed their continent, richer than any other, from the east coast to the west, new resources became revealed to them, new interests took possession of them, and they used the old resources in new ways. In the East, the rivers meant to them only means of transportation; in the West they began to see that the rivers meant first of all crops; that they must put the rivers on the land before they could grow wheat, and alfalfa, and fruits, and all the things that make the West rich. They found that to feed the vast population which had grown up in the eastern country they must have the vast ranges of the West to grow meat; that the resources which produced the wheat, and the meat, and the cotton, and the iron, and coal, and timber, all together made the working capital of a great nation, and that the nation could not grow unless it had all of these things. In taking possession of them, our nation used them with greater effectiveness, greater energy and enterprise, than any other nation had ever shown before. Nothing like our growth, nothing like our wealth, nothing like the average happiness of our people, can be found elsewhere; and the fundamental reason for this is, on the one side, the vast natural resources which we had at hand, and, on the other side, the character and ability and power of our people.

Now what have we done with these resources which have made us great, and what is the present condition in which this marvelously vigorous nation finds itself? The keynote of our times is "development." Every man, from New York to San Francisco, wants the development of the natural resources, the advantages, the opportunities which surround him, his neighbors, and his friends. Any one who questions the wisdom of any of the methods we are using in bringing that development to pass, because he believes we are making mistakes that will be expensive later, is in danger of being considered an enemy to prosperity. He is in danger of having it thought of him that he does not take pride in our great achievements, that he is not a very good American. But in reality it is no sign that a man lacks pride in the United States and the wonderful things our people have done in developing this great country because he wants to see that development go on indefinitely. On the contrary, real patriotism and pride in our country make it the first of all duties to see that our nation shall continue to prosper. In sober truth, we have brought ourselves into a present condition in which a very serious diminution of some of our resources is upon us.

WHAT A TIMBER FAMINE WOULD MEAN

A third of this country was originally covered with what were, all in all, the most magnificent forests of the globe—a million square miles of timber land. In the short time, as time counts in the life of nations, that we have been here, we have all but reached the end of them. We thought it unimportant until lately that we have been destroying by fire as much timber as we have used. But we have now reached the point where the growth of our forests is but one-third of the annual cut, while we have in store timber enough for only twenty years at our present rate of use. This wonderful development, which would have been impossible without the cutting of the forests, has brought us where we really face their absolute exhaustion within the present generation. And we use five or six times more timber per capita than the European nations. A timber famine will touch every man, woman, and child in all the land; it will affect the daily life of every one of us; and yet without consideration, without forecast, and without foresight, we have placed ourselves, not deliberately, but thoughtlessly, in a position where a timber famine is one of the inevitable events of our near future.

Canada cannot supply us, for she will need her timber herself. Siberia cannot supply us, for the timber is too far from water transportation. South America cannot supply us, because the timbers of that vast continent are of a different character from those we use, and ill-adapted to our needs. We must suffer because we have carelessly wasted this great condition of success. It is impossible to repair the damage in time to escape suffering.

But forests only begin the story of our impaired capital. Our anthracite coals are said to be in danger of exhaustion in fifty years, and our bituminous coals early in the next century; some of our older oil fields are already exhausted; the natural gas has been wasted—burning night and day in many towns of this country until the supply has failed. Our iron deposits grow less each year. Our ranges in the West, from which we first drove the buffalo to cover them again with cattle and sheep, are capable of supporting but about one-half what they could under intelligent management; and the price of beef is raised. Nearly every one of our wonderful resources we have used without reasonable foresight and reasonable care, and as each becomes exhausted a heavier burden of hardship will be laid upon us as a people.

Now what is our remedy? The remedy is the perfectly simple one of common sense applied to national affairs as common sense is applied to personal affairs. This is no abstruse or difficult question. We have hitherto as a nation

taken the same course as did at first the young man who came into possession of his new property. It is time now for a change.

It is true that some natural resources renew themselves, while others do not. Our mineral resources once gone are gone forever. It may appear, therefore, at first thought that conservation does not apply to them, since they can be used only once; but this is far from being the fact. Methods of coal mining, for instance, have been permitted in this country which take out on the average but half of the coal, and then in a short time the roof sinks in on the other half, which thereafter can never be mined. Oil and natural gas also have been and are being exploited with great waste, and as though there never could be an end to them. The forests we can replace at great cost and with an interval of suffering. The soil which is washed from the surface of our farms every year to the amount of a billion tons, making, with the further loss of fertilizing elements carried away in solution, the heaviest tax the farmer has to pay, may in the course of centuries be replaced by the chemical disintegration of the rock; but it is decidedly wiser to keep what we have by careful methods of cultivation. We may very profitably stop putting our farms into our streams, to be dug out at great expense through river and harbor appropriations. Fertile soil is not wanted in the bed of a stream, and it is wanted on the surface of the soil of the farms and the forest-covered slopes of the mountains; yet we spend millions upon millions of dollars every year removing from our rivers what ought never to have got into them.

A MONOPOLY OF OUR GREATEST NATURAL RESOURCE, WATER POWER, SHOULD BE PREVENTED

Besides exhausting the unrenewable and impairing the renewable resources, we have left unused vast resources which are capable of adding enormously to the wealth of the country. Our streams have been used mainly in the West for irrigation and mainly in the East for navigation. It has not occurred to us that a stream is valuable not merely for one, but for a considerable number of uses; that these uses are not mutually exclusive, and that to obtain the full benefit of what the stream can do for us we should plan to develop all uses together. For example, when the national government builds dams for navigation on streams, it often disregards the possible use, for power, of the water that flows over those dams. Engineers say that many hundred thousand horse-power are going to waste over government dams in this way. Since a fair price for power, where it is in demand, is from $20 to $80 per horse-power per year, it will be seen that the government has here—developed yet lying idle—a resource capable of adding enormously to the natural wealth. So, also, in developing the western streams for irrigation, in many places irrigation and power might be made to go hand in hand.

If the public does not see to it that the control of water power is kept in the hands of the public, we are certain in the near future to find ourselves in the grip of those who will be able to control, with a monopoly absolutely without parallel in the past, the daily life of our people. Let us suppose a man in a western town, in a region without coal, rising on a cold morning, a few years hence, when invention and enterprise have brought to pass the things which we can already foresee as coming in the application of electricity. He turns on the electric light made from water power; his breakfast is cooked on an electric stove heated by the power of the streams; his morning newspaper is printed on a press moved by electricity from the streams; he goes to his office in a trolley car moved by electricity from the same source. The desk upon which he writes his letters, the merchandise which he sells, the crops which he raises, will have been brought to him or will be taken to market from him in a freight car moved by electricity. His wife will run her

sewing-machine or her churn and factories will turn their shafts and wheels by the same power. In every activity of his life that man and his family and his neighbors will have to pay toll to those who have been able to monopolize the great motive power of electricity made from water power, if that monopoly is allowed to become established. Never before in the history of this or any other free country has there existed the possibility of such intimate daily contact between a monopoly and the life of the average citizen.

It has not yet occurred to our people that this great power should be conserved for the use of the public. We have regarded it as a thing to be given away to any man who would take it. We have carried over our point of view, derived from the early conditions, when it was a godsend to have a man come into the country to develop power, and we were willing to give him anything to induce him to come. We have carried over that point of view into a time when the dread of a monopoly of this kind ought to be in the mind of the average man everywhere. That is an instance of a resource neglected from the point of view of the public.

But this is a time to consider not one resource, but all resources together. Already here and there small associations of citizens have become possessed of certain facts, and have begun to work at certain sides of what is fundamentally one great problem. We have a drainage association, whose object is to make habitable millions upon millions of acres now lying waste in swamps all over the country, but capable of supporting millions of people in comfort. We have forestry associations, waterway associations, irrigation associations, associations of many kinds touching this problem of conservation at different points, each endeavoring to benefit the common weal along its own line, but each interested only in its own particular piece of the work and unaware that it is attacking the outside, not the heart, of the problem.

Now a greater work appears. Since this problem of the conservation of natural resources is a single question, each of these various bodies that have been working at different phases of it must come together on a common platform. By the joining of these units we shall have a mass of intelligent, interested, public-spirited citizens anxious to adopt a new point of view about this country of ours.

That is the crux of the whole matter—a new point of view about our country. We have been so busy getting rich, developing, and growing, so proud of our growth, that we have let things go on until some intolerable abuse has compelled immediate action to cut it off. It is time that we put an end to this kind of opportunism, of mere drifting. We must take the point of view taken by the average prudent business man, or man in any walk of life who has property and is interested in it. What the average man does in his own affairs is to foresee trouble and avoid it if he can. What this nation of ours is doing in this fundamental matter of natural resources is to run right up against the trouble and make that trouble inevitable before taking any step to head it off. But it should not take long to reach the stage where we shall deliberately plan to avoid the difficulties which can be foreseen, if we can bring together all who have already begun to concern themselves with one or another aspect of the conservation problem.

THE PRESENT IS ONE OF THE MOST CRITICAL POINTS OF OUR HISTORY

This nation has, on the continent of North America, three and a half million square miles. What shall we do with it? How can we make ourselves and our children happiest, most vigorous and efficient, and our civilization the highest and most influential, as we use that splendid heritage? Shall not the nation undertake to answer that question in the

spirit of wisdom, prudence, and foresight? There is reason to think we are on the verge of doing this very thing. We are on the verge of saying to ourselves, Let us do the best we can with our natural resources; let us find out what we have, how they can best be used, how they can best be conserved. Above all, let us have clearly in mind the great and fundamental fact that this nation will not end in the year 1950, or a hundred years after that, or five hundred years after that; that we are just beginning a national history the end of which we cannot see, since we are still young. In truth, we are at a critical point in that history. As President Roosevelt has said, we are at the turning of the ways. We may pass on along the line we have been following, exhaust our natural resources, continue to let the future take care of itself; or we may do the simple, obvious, common-sense thing in the interest of the nation, just as each of us does in his own personal affairs.

On the way in which we decide to handle this great possession which has been given us, on the turning which we take now, hangs the welfare of those who are to come after us. Whatever success we may have in any other line of national endeavor; whether we regulate trusts properly; whether we control our great public-service corporations as we should; whether capital and labor adjust their relations in the best manner or not—whatever we may do with all these and other questions, behind and below them all is this fundamental question, Are we going to protect our springs of prosperity, our sources of well-being, our raw material of industry and commerce and employer of capital and labor combined, or are we going to dissipate them?

According as we accept or ignore our responsibility as trustees of the nation's welfare, our children and our children's children for uncounted generations will call us blessed or will lay their suffering at our doors. We shall decide whether their lives, on the average, are to be lived in a flourishing country, full of all that helps make men comfortable, happy, strong, and effective, or whether their lives are to be lived in a country like the miserable outworn regions of the earth which other nations before us have possessed without foresight and turned into hopeless deserts.

We are no more exempt from the operation of natural laws than are the people of any other part of the world.

When the facts are squarely before us, when the magnitude of the stake is clearly before our people, surely this question will be decided aright.

HUNTING BEARS ON HORSEBACK

THE remarkable illustrations on pages 352-355 were sent to this magazine by Mr Alan D. Wilson of Philadelphia, a member of the National Geographic Society. They were taken by him in October, 1907, during a hunting trip in Wyoming. In sending the photographs Mr Wilson writes:

The wolverine and bear we ran with John B. Goff's pack, which we followed on horseback, and which, by the way, is the greatest sport I have ever had. I send a photograph of the five hounds, but unfortunately I did not get a good photograph of the eighteen terriers and mongrels, who made up the fighting pack, which I regret extremely, as they were the cleverest, gamest lot of little rascals I ever saw, and they were always the ones who had to bear the brunt of the trouble.

The wolverine is interesting and the photograph is, I think, almost unique, for they are not only rare, but generally

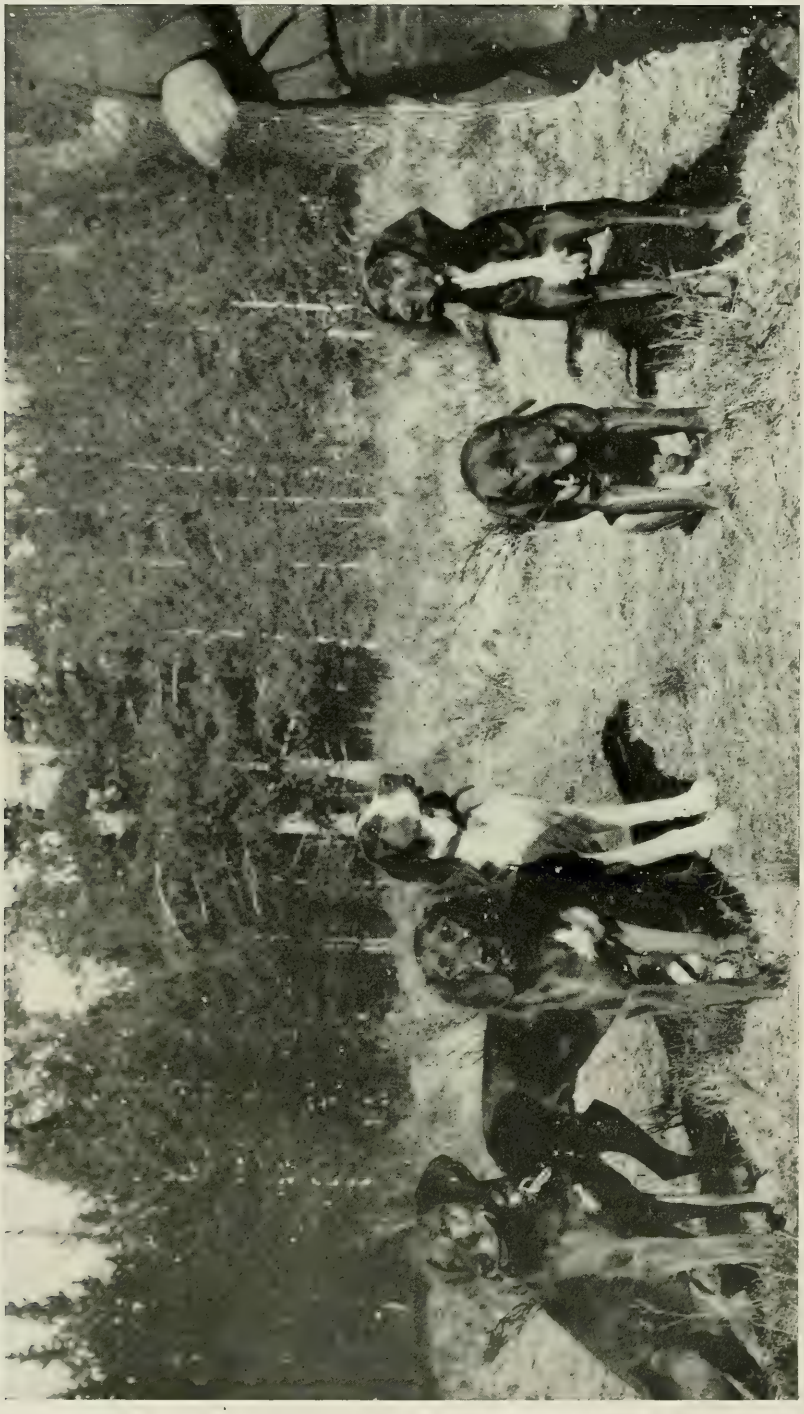
prefer to go over the rimrock, when the dogs are after them, rather than tree.

All our hunting was done in the national timber reserve just east of the Yellowstone Park, in Big Horn County, Wyoming. It is a high, rough, broken, mountain country, and we were hunting on the headwaters of the following creeks flowing into the north fork of the Shoshone River: Eagle, Kitty, Fishhawk, Sheep, East and West Black Water, Wapiti or Elk Fork, Gun Barrel or Gothic, Goff, and Clearwater—a country about twenty-five miles east and west and thirty-five miles north and south, which lies about fifty miles west of Cody, from which point we outfitted. All the game was killed south of the Shoshone River.

In as rough a country as this is, it takes very good horse flesh to do the work, for the bear travels pretty fast, there is plenty of down timber in the valleys, and a great deal of hard climbing. Mr Goff has a picked lot of horses, bigger than the usual western pony, and therefore up to their work, and all of his horses will either pack or ride; so that we were able to have four fresh horses a day and then not work a horse again for three or four days, as he had twenty-two horses in the outfit. I never could see how a horse could be as sure-footed or go in places these horses did, for in the course of bear hunting we crossed every divide from Eagle Creek to Elk Fork, six in number, pretty well up toward headwater and without a trail other than game trails, and only one horse went down on the trip, and that was in fording a deep stream. As an instance of their hardihood, we jumped one bear at 11 a m., followed him on horseback until 5 p. m., a part of which time we lost the dogs and spent a couple of hours before we heard them again; finally got in country we could not ride, tied up the horses, who were soaking wet, went on for an hour on foot, and killed the bear at 6 p. m. By the time we had dressed him it began to get dark, with the result that we lost our horses, laid out all night on the top of a mountain, and in the morning, when we found the horses, none of them were stiff or sore, although there had been a hard frost in the night.

The dogs of course deserve the chief credit. Goff has a splendid pack, which is thoroughly broken not to run deer, elk, or sheep. The hounds of course do the main work, from the time the bear track is picked up until the bear is jumped, but they are not keen to go in and fight, and unless you have something that will do this, and do it sufficiently vigorously to retard progress, there is not much chance of keeping up with them on horseback and getting a shot at the bear. This is where the fighting pack becomes all important, and it is the most difficult thing to get a dog properly adapted to the work. He must be willing to run for an hour or so with the hounds, with only anticipation to help him along, until the bear is jumped. Then he must have not only pluck enough to go in and fight, but intelligence enough to know the only chance a dog has with a bear is to take an occasional nip, and then get out of the way; and, further, he must have sufficient size and bone to be able to keep up with the hounds over a big, rough country.

We had almost everything in the pack: Mongrel bull terriers, stag hounds (a cross between a stag hound and a bull terrier), an old English sheep dog (a cross between a fox terrier and a shepherd), who, by the way, was the greatest hunter and gamest dog I ever saw. He had had his thigh broken by a grizzly six months before, and while with us was bitten through the face, but, with only three legs, he was always at the head of the fighting pack. We had some Irish terriers and six Airedales. The bull terriers go in and take hold and get killed. The stag hounds won't stay long with the hounds unless the bear is properly jumped. Only occasionally will a mongrel develop the proper qualities. The Irish terriers are too small to properly run the country, but the big, sturdy Airedales are just



FIVE HOUNDS OF MR JOHN B. GOFF'S PACK

Photo by Alan D. Wilson, Philadelphia

Photo by Alan D. Wilson, Philadelphia

WOLVERINE CLIMBING A TREE TO ESCAPE PURSUING DOGS

Photo by Alan D. Wilson, Philadelphia

BEAR CLIMBING A TREE TO ESCAPE PURSUING DOGS

Photo by Alan D. Wilson, Philadelphia

THE FISH HAWK CREEK BEAR

the dogs for the work. They have a surprisingly good nose—good enough to run a trail themselves if it is warm—and are therefore interested before the bear is jumped. They will stay all day with the hounds, and instinctively they seem to know just exactly how to fight a bear to get the best results with the least damage to themselves. Added to this, they are as game as a dog can be and are pleasant to have about.

A brown bear which we ran into a hole, where the dogs followed her, punished the dogs severely. There were only eight dogs in at the finish, and every one of them was badly bitten or clawed, except Old Captain, the lead hound of the pack, who wisely would not go in the hole; yet every one of them, after coming out and licking his wounds for a few minutes, went back for more, and after we had finally smoked out the bear, again brought her to bay in the bed of a stream, where Mrs Wilson killed her.

I am sorry that I have no good photograph of the fighting pack, and especially of Don, the little cross between a fox terrier and a shepherd. He looked less like a bear dog than any animal I ever saw, but his courage was really pathetic, for he was sick and miserable from his wounds, but could not be kept at home, and when he got close to a bear, it was perfectly evident that he was seeing "red." Any game looked good to him, however, for on the way home from killing a bear he would joyfully tree squirrels, and then put in the night hunting pack rats and mice.

PERSIA: THE AWAKENING EAST

By W. P. Cresson

The following article is abstracted from a new book on Persia just published by Messrs J. B. Lippincott Company, of Philadelphia, entitled "Persia, the Awakening East," by W. P. Cresson. Persia, one of the oldest kingdoms in the world, is now undergoing a complete transformation in administration and in commercial life, so that this admirable volume is particularly useful at the present time. The author recently spent several months in Persia, being the guest of the American Minister to Teheran, and had exceptional opportunities for seeing the country. Particularly good chapters are: The Religions of Persia; A Visit to the Sacred City of Kum; Hawking in Persia; Bagdad of Today; A Pilgrimage to Kerbela; The Persian Gulf. The article is copyrighted by J. B. Lippincott Co.*

WE entered Persia by way of the Caspian, stopping first, however, at the wonderful Russian oil-fields at Baku, near the Persian frontier. Marco Polo, in his fascinating book of travels, speaks of them as follows:

"On the confines towards Georgianna there is a fountain from which oil springs in great abundance, insomuch that a hundred ship-loads might be taken from it at one time. This oil is not good to use with food, but it is good to burn, and is also used to anoint camels that have the mange. People come from vast distances to fetch it, for in all countries around have they no other oil."

The oil-fields were exploited many centuries before the arrival of the Russians, but it is only within the last twenty years that the commerce in naphtha has become the most important industry of the Caucasus. Good Sir Marco would have been surprised to know that future generations would find in his "burning spring" a mine of riches compared to

* Pp. 300. Illustrated. $3.50.

which the treasures of Golconda pale into insignificance, and that on the desert near by would arise a great city, peopled by a restless throng of wealth-seekers drawn from every corner of the globe.

The drive from the railway station to the oil-fields lay along a slippery road, deep with oily mud, into which our conveyance sank almost to the hub. By the wayside, half-naked Tatars were busily skimming the waste oil from the surface of slimy pools and rivulets, and our guide told us that even at this miserable business they make an excellent profit. To touch foot to the ground meant irretrievable ruin to boots and clothing, so that every one (even the natives) rode, and a file of rickety vehicles stretched in a continuous procession along the narrow highway. Every form of wheeled conveyance was represented, from spring wagons of American make to high Turcoman carts set on enormous wheels often eight feet or more in diameter.

The surface of the country surrounding the oil-fields seemed literally to exude crude petroleum, and the stench from the slough through which we were slowly traveling was indescribable, although fortunately by this time we were beginning to grow accustomed to the odor.

As we approached nearer, the clank of pulleys and windlass filled the air. In every one of the tall timber pyramids that covered the mouth of the narrow "borings" a Tatar workman watched the simple mechanism that lets down a long metal bucket into the bowels of the earth and draws it up filled with crude petroleum mixed with water and sand. Within recent years American tools and methods have increased the output of the wells a hundred-fold. The present system of boring is copied from the methods used in the Pennsylvania oil-fields, and many of the engineers who direct the operation for the Russian companies are Americans or Englishmen. In the old days, under the reign of the petroleum monopoly, the Russian concessionaires were content to confine their operations to enlarging the natural wells and springs of naphtha which rise to the surface of the earth all over the plateau of Bala-Khané.

But with the advent of foreigners these primitive methods have been abandoned. The wells are now sunk far down through sand and rock in search of rich strata and fresh beds of oil sand, and the costly instruments used represent the triumph of years of Yankee ingenuity and experience in the oil-fields of the New World. In spite of fears to the contrary, there appears no end to the supply of crude petroleum. Even at the time of their maximum output, the flow of oil from the wells of Baku was apparently undiminished. Under the plateau of Bala-Khané lies an underground sea of naphtha, and in some places but a few yards of oil-soaked earth covers this natural reservoir. Once the "crust" has been pierced by the drill, the oil comes gushing of its own accord to the surface, driven by the force of natural gases. Just before the riots of 1905, the yearly output of the oil-wells of Baku amounted to more than twelve and one-half million tons of refined oil, and the most important problem confronting the oil companies was that of mutually limiting their output in order to keep the price at a profitable figure.

During our visit we had an opportunity to view at close quarters the wild hordes of Tatar workmen employed in the oil-fields. A more abject and degraded lot of human beings it would be difficult to find anywhere on the face of the earth. Their villages of mud huts were set down on the treeless, sandy plain, far enough away from the wells for them to light their cooking fires in safety, and here we found the stench of oil, added to the all-pervading odors of Oriental housekeeping, almost overpowering. Some of the foreign companies make a pretense of housing their workmen in long wooden sheds, which are forcibly cleaned at rare intervals, but by far the greater number live in rough en-

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HIS IMPERIAL MAJESTY MOHAMMED ALI, SHAH OF PERSIA, WEARING THE KAJAR

Photo and Copyright by Underwood & Underwood, New York

HIS IMPERIAL HIGHNESS, THE CROWN PRINCE OF PERSIA

Photo and Copyright by Underwood & Underwood, New York

THE ANDEROOM PALACE

The home of the Shah's harem, where each wife and favorite has her own household establishment, thus forming a big family of several hundred women

campments, where they are at liberty to satisfy their own ideals of comfort and sanitation.

Most of these workmen in the oil-fields are Mohammedans, and, strange to say, their piety is a source of constant annoyance to their employers. In view of the recent controversy in the American newspapers concerning the oil-"tainted" contributions of a well-known magnate to the funds of a foreign missionary society, the following incident of our visit to the oil-fields of Bala-Khané may not be without interest. As we were being shown through the pumping-house belonging to a Russian company, our guide, a sturdy Dutchman from the oil-fields of Pennsylvania, suddenly came upon a Tatar workman lying prostrate, his face toward Mecca, on a strip of greasy carpet among the idle machinery. Without giving him time to struggle to his feet, our friend raised him more suddenly than gently with a well-applied kick:

"Choist look at dese fellows!" he exclaimed, indignantly; "ve haf to vatch dem or dey pray de whole tam time!"

"Vat mit Mohammedan feast days and Russian saints' days ve get no work done at all. Vat ve need is a cargo of good missionaries to convert de whole tam lot." he added vindictively.

Here is a new aspect of the missionary question, which has, perhaps, never been given proper consideration at home!

Shortly after the commencement of the Japanese war a general strike broke out at Baku, and the wild workmen of Bala-Khané marched on the town, leaving behind them, in place of the scene of busy industry I have described, the fire-blackened ruins of a few pump-houses and the burning craters of hundreds of oil-wells. Thus in the short space of a few hours the petroleum industry of Baku was literally wiped from the face of the earth. But while the oil-fields have never recovered their former productiveness, the damage is now being gradually repaired, and Russian oil once more supplies the markets of southern Europe and the middle East.

RUSSIAN ENTERPRISE IN NORTHERN PERSIA

The road leading from the shores of the Caspian to the capital of Persia has been open to general traffic for several years. Considered merely as a financial investment, the million and a half dollars expended by the Russians in building this fine highway may seem out of all proportion to the returns, but there can be no question as to the important part it has played in forwarding Russian interests in northern Persia. Its fame has gone abroad through every caravansary of the middle East, and where a railroad would have disturbed a host of ancient customs and privileges dear to the inhabitants of the country, this new way has only lightened the difficulties and hardships that once beset travelers and traffic on the old caravan road. New villages are springing up everywhere along the route, and the Russians take good care that the inhabitants should know that to Russian enterprise alone this happy change in their fortunes is due.

The engineering work of the Resht post-road has been carried out in a thoroughly durable manner. Often hewn from the solid rock of the mountain side or crossing deep ravines by girder bridges of the most modern construction, it forms a striking example of the Russian policy of "peaceful penetration" that owes its inception to the real "strong man" of Russia, Serge de Witte.

Following the natural path of least resistance, sometimes high above us on the mountain side, sometimes winding along the valley below, I could make out the fading gray streak of what was once the old Persian caravan track. From time immemorial this ancient road had been the great commercial highway between the shores of the Black Sea and the rich provinces of northern Persia. Most of the trade of Khorassan still follows this route until it reaches the Russian railways in the Caucasus, while merchandise transported from Russia is sold in every bazaar as far as the Afghan frontier.

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ARMENIAN GIRLS OF THE PROVINCE OF URUMIAH, WHERE THE PERSIAN DISTURBANCES WERE GREATEST

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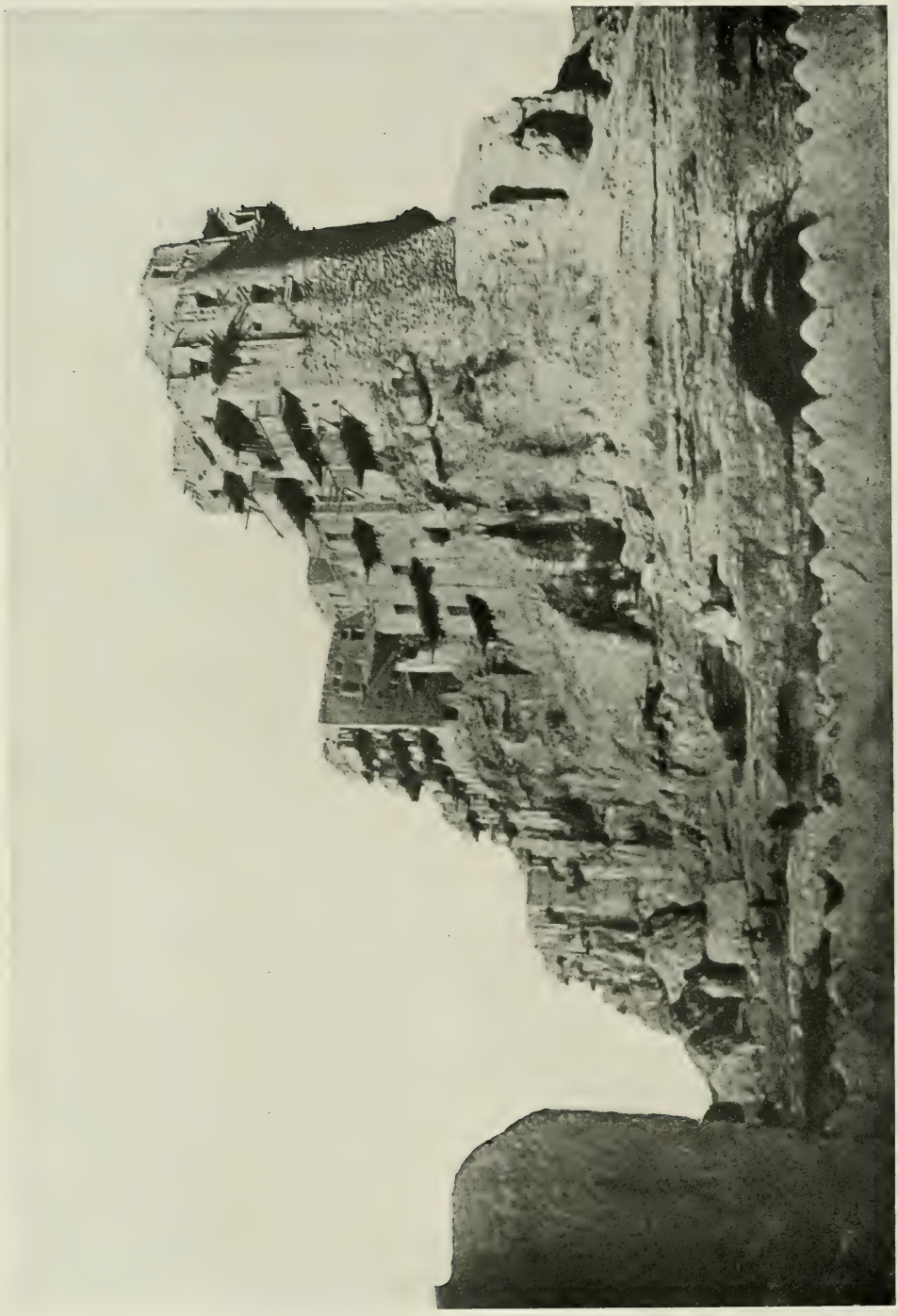
THE HIGH PRIEST SEYED ABDOLLAH MOSHTEHID, OF TEHERAN



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AN ANCIENT PERSIAN VILLAGE NEAR THE TURKISH FRONTIER

The post carriages and four-wheeled freight wagons brought from Europe are still comparatively rare, and the greater part of the merchandise is carried by means of caravans and droves of pack animals. During our first day's journey we passed thousands of camels traveling in long files stretching sometimes for a quarter of a mile without a break, each fastened by a long cord attached to a ring fixed in its supercilious nose to the saddle of the one ahead. The Bactrian camels used on these cold mountain trails of northern Persia are very different in appearance from the gaunt, apocalyptic beasts seen in the deserts of Egypt. Indeed, the true Bactrian is a very handsome animal (judged at least by the standards of camel beauty), his neck and shoulders covered with a long growth of soft brown hair, which hides the rude outlines of his powerful frame. A good Persian camel is capable of carrying with ease a load of a thousand pounds, and as they are often the whole fortune of their owners, they are treated with the best of care and attention.

THROUGH A DESERT LAND

Now and again the white gleam of a salt marsh, seen on the horizon, or the pearly mist of a distant mirage would persuade us that we were approaching the life-giving presence of water—an illusion which receded or disappeared on our nearer approach.

The traveler, read in the poetry and literature of the Golden East, soon learns to appreciate the Oriental's point of view in judging the beauties of nature. Compared to the verdant scenery of Europe, there is little to admire in the landscape of northern Persia; yet these lonely wastes are not without a certain wild beauty of their own. The great drama of morning and evening tints the desert with wonderful hues that shift and blend like the changing colors of the sea, and in the fierce light of noonday strange cloud shadows play across its surface, relieving the monotonous uniformity of rock and sand.

Contrast, indeed, is the keynote of desert life. No gardens have ever seemed to me half so beautiful as some walled inclosure, filled with scanty rows of orange and lemon trees, found at the end of a long day's ride across the arid Persian plain. No fruit has ever had so rare a taste as the little yellow citrons brought us by Persian peasants, in some dusty caravansary, as we lay resting our weary limbs among our saddle-bags on the hard mud floor.

To the poets of Persia we owe the common impression that their beloved country is a land of gardens and flowers. Their Oriental imagination has woven a veil of romance about the "Fields of Iran," while throughout the greater part of the Shah's dominions the very reverse of this legend of fertility is nearer the truth. The life of the Persian peasant is one long struggle with the adverse forces of nature. Such rare cultivation as we saw depended entirely on artificial irrigation by means of underground channels leading to distant reservoirs among the mountains that generations of toilers have hollowed out with infinite pains, often hundreds of feet below the level of the land. The few villages that we passed were miserable collections of mud huts whose inhabitants earned a precarious existence by trading with the travelers along the caravan road.

A CITY OF CONTRASTS

The sentimental traveler visiting Teheran for the first time, who expects to find in the Shah's capital some fabulous city of the "Arabian Nights," is destined to be disappointed. Persia has long since awakened from her golden dream of the past. Like Japan, the Land of the Lion and the Sun has fallen under the spell of Western ideas, and the Persian of today is striving to adapt his ancient civilization to the ways and customs of Europe with the same energy and lack of discrimination that characterize the victorious sons of Nippon.

In Persian eyes, at least, Teheran is a

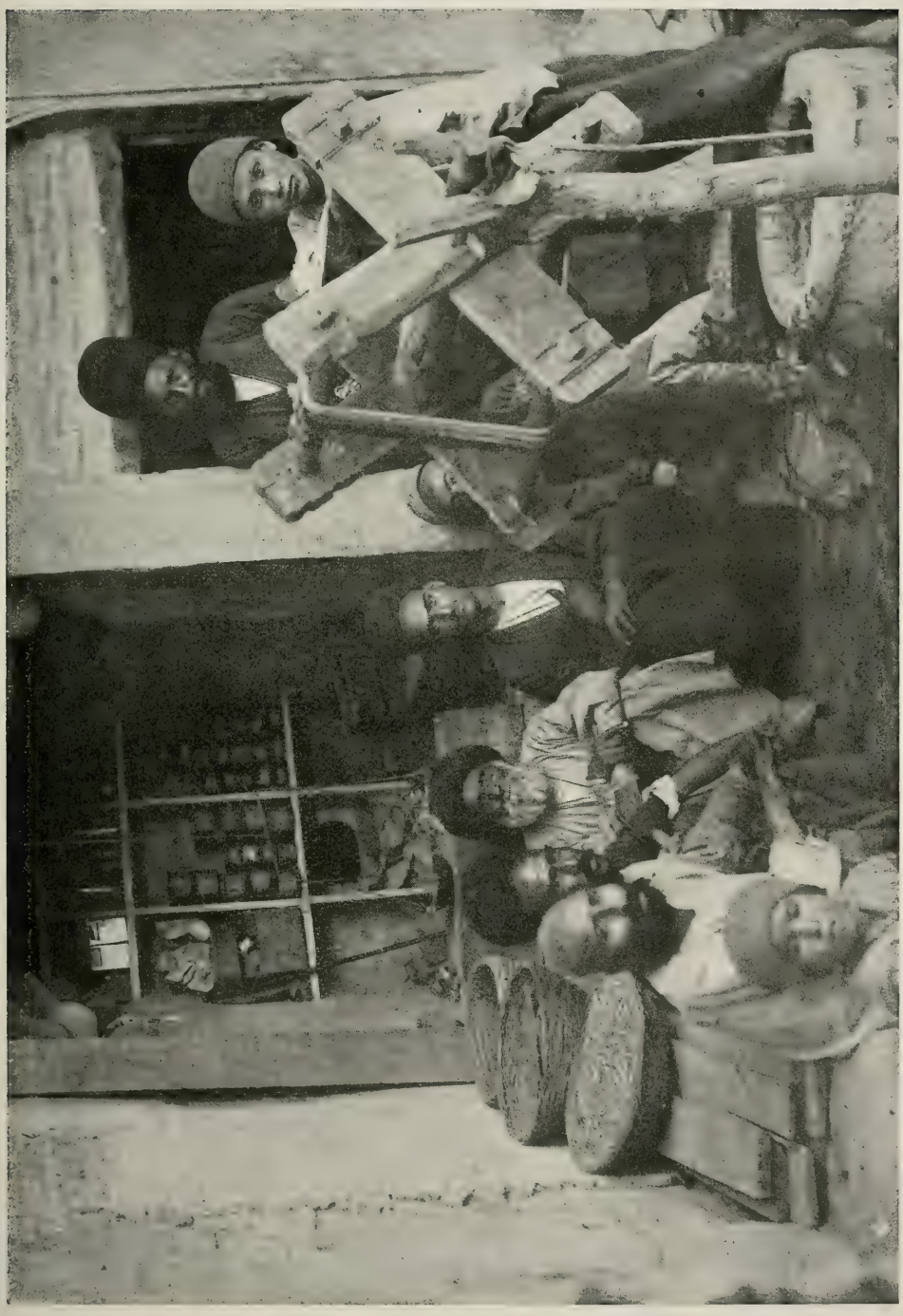
European city. The wide streets and tree-lined avenues of the newer quarter of the town date from the reign of Shah Nasr-ed-Din, grandfather of the present Shah, who returned from a visit to Europe fired with the ambition of transforming his capital into an Oriental Paris. But the Persian of the lower classes is a fanatical conservative; the strange madness that drives his rulers to leave the blessed shores of Iran to wander in infidel lands beyond the seas seems to him wholly foreign and distasteful. The Shahs of the present dynasty have spent large sums in enlarging and embellishing their capital, and while Teheran can scarcely be said to rival the natural beauties of Shiraz or the architectural splendors of Ispahan, it is now considered the metropolis of Persia.

The climate of this part of the Iranian plateau, varying from extreme heat in summer to bitter cold during the winter months, leaves much to be desired. On account of the high elevation, sudden and violent changes of temperature occur; and I remember witnessing, soon after our arrival, the curious spectacle of a rose garden in full bloom suddenly overwhelmed and buried beneath a fall of early snow. To these discomforts must be added the high winds, which raise clouds of choking dust and sand from the broad unpaved streets during the dry months of the year. Nevertheless, Teheran is a very healthful spot, and in spite of the primitive methods of sanitation still in vogue, the death rate among its population remains comparatively low.

The varied types of humanity that go to make up the population of the "City of Contrasts" are perhaps never seen to such striking advantage as on some sunny winter's day on this favorite promenade of the citizens of Teheran. Threading his way carefully through the streams of traffic, a fat mollah ambles by on a lazy mule, toward the mosque. Next comes a smart young attaché from the foreign legations, on his way to play polo on the Maidan, or a Cossack of the Shah's body-guard, dressed as nearly like a Russian soldier as possible. A court official in a Parisian landau, surrounded by a galloping troop of attendants, goes charging through the crowd, with loud cries of "Kabardah! Kabardah!" ("Make way! make way!"). Next, a wild-eyed dervish adds his loud cries to the general confusion, in an insolent demand for the alms of the Faithful; or a party of Persian women, in baggy black pantaloons, their faces hidden by thick linen masks, pass in single file, under the escort of a negro eunuch. And at intervals the finishing touch is added to this Oriental scene when a tramway, crowded to the roof with native passengers, goes jostling its way through the long files of camels and pack-horses on their way to the bazaars—perhaps the most popular European innovation in the Persian capital.

THE BAZAARS

While the broad streets and squares of the new quarters of Teheran give the many parts of the city quite a European appearance, the older quarters that lie about the bazaar still retain all the characteristics of the Orient. Here, in a labyrinth of narrow lanes and alleyways, where even the oldest Teherani often finds himself at a loss which way to turn, centers the whole commercial life of the city. In Teheran, as in most of the cities of northern Persia, the main bazaar consists of a series of long passageways covered by a roof of vaulted brick-work. Between the buttresses that support the roof are narrow niches which serve as shops and booths, and these again open at the back into great court-yards or "caravansaries," where the goods are stored on their arrival, and where the weary camels and pack animals of the caravan road are stabled after their long journey. Few of the largest of these shops are more than twenty feet square, and the merchant, sitting on a narrow ledge or counter before his booth, is within easy reach of every article in his stock; yet the amount of business transacted in this primitive way is often con-



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A PERSIAN DRUG SHOP AND WELL: TEHERAN

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PERSIAN BAKERY TO THE LEFT AND GROCER'S SHOP TO THE RIGHT: TEHERAN

Note the peculiar shape of the flat loaves in the bakery, also seen in the illustration on the following page

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A WAGON LOAD OF BREAD: TEHERAN

Note the long, flat loaf held by the driver of the cart

Photo and Copyright by Underwood & Underwood, New York

A PERSIAN MERCHANT OF SECOND-HAND CLOTHING: TEHERAN

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"KEJAVEHS," THE UNCOMFORTABLE CHAIRS IN WHICH WOMEN AND CHILDREN TRAVEL IN PERSIA
Two of these peculiar chairs are balanced on the back of each pack animal, as shown in the illustration

Photo and Copyright by Underwood & Underwood, New York

A CARAVANSARY OR "HOTEL" ON THE ROAD TO SHIRAZ, PERSIA

Inside its walls is an immense court yard, where travelers are herded indiscriminately with their camels and other beasts of burden. These "hotels" are designed to give the caravans a resting place at night protected from marauders

siderable and many of the bazaar merchants are rich men, judged even by the standard of New York and London.

There are still a few good curios to be picked up in the bazaars; but a majority of the articles exposed for sale are manufactured in Europe, while most of the native rugs and carpets show the regrettable influence of European patterns and aniline dyes. It is unfortunately true that throughout the East today the machine-made products of the unbeliever are everywhere crowding out the fabrics of the old hand-worker. Indeed, many famous Oriental industries are fast disappearing, and the native craftsmen work only for export to the European market, while their compatriots prefer the cheaper if less esthetic patterns of the Occident. Thus the fine cloths once manufactured in Resht and Kashan have given way before the products of Manchester and Odessa. Even the coarse canvas-like stuff, the universal dress of the poorer classes in Persia, which was once woven during the winter months on crude native looms, now comes in greater part from the Yankee mills of Connecticut, while New York and Birmingham are as familiar names today in the bazaars of Teheran as were once those of Bokhara and Bagdad.

A whole quarter of the bazaars of Teheran is given over to the sale of European goods, usually of the cheapest and shoddiest description. At one time most of these shops were supplied with English wares, but of late years the Russians have secured for themselves a lion's share of the general trade of northern Persia.

DEMANDS FOR A CONSTITUTION

The strong nationalistic spirit that marks the new era in Persian affairs is one of the most interesting features of the present movement in Persia. It is not among the frock-coated European dandies of the court that we must look for the men who are now taking the leading part in the new agitation for reform. Many of the constitutionalistic leaders wear the flowing robes and white turban of the Mohammedan priesthood. Recently the Liberal Parliament by an overwhelming majority voted to suppress the publication of a Teheran newspaper which had dared to propose the substitution of a new civil code modeled on European lines for the old common law based on the precepts of the Koran. One of the chief causes of popular complaint against the leaders of the Court party is their subserviency to foreign influences and their unpatriotic policy of importing foreign officials into Persia, notably in the case of the customs administration.

The Mutjehids, or religious lawgivers, at one time started in a body for the sacred city of Kerbela as a protest against the fashion in which their advice and demands were ignored by the Court party, and had already proceeded for some distance on their way before the latter were constrained to relent. In the meanwhile the Liberal leaders in Teheran, fearing the vengeance of the troops in the pay of the government, had taken refuge in the compound of the British legation, where, according to treaty rights, they were safe against arrest or persecution. It was reported at the time that no less than 13,000 inhabitants of Teheran had thus thrown themselves on the mercy of a foreign government.

Alarmed by this determined though pacific resistance, and by the sympathetic attitude of a large part of the population, the late Shah's advisers at last decided to yield, and a manifesto was issued in the name of Muzaffar-ed-Din calling for a duma, or popular assembly. The document summoning the first Persian Parliament was worded as follows:

"The Shah, since his accession to the throne, has always had the intention to introduce real and efficient reforms in all the departments of the state, so as to further the well-being of his people. For this purpose His Majesty has now decided that a national council shall be formed at Teheran, composed of representatives of the Kajar princes (the

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CROWD OF PERSIAN REVOLUTIONISTS

Who, fearing the vengeance of the royal troops, took refuge in the British Legation in Teheran in 1906, and insisted on remaining there until the Shah gave them a Parliament

CROWDS OF REFUGEES AT THE BRITISH LEGATION DURING THE AGITATION FOR A CONSTITUTION

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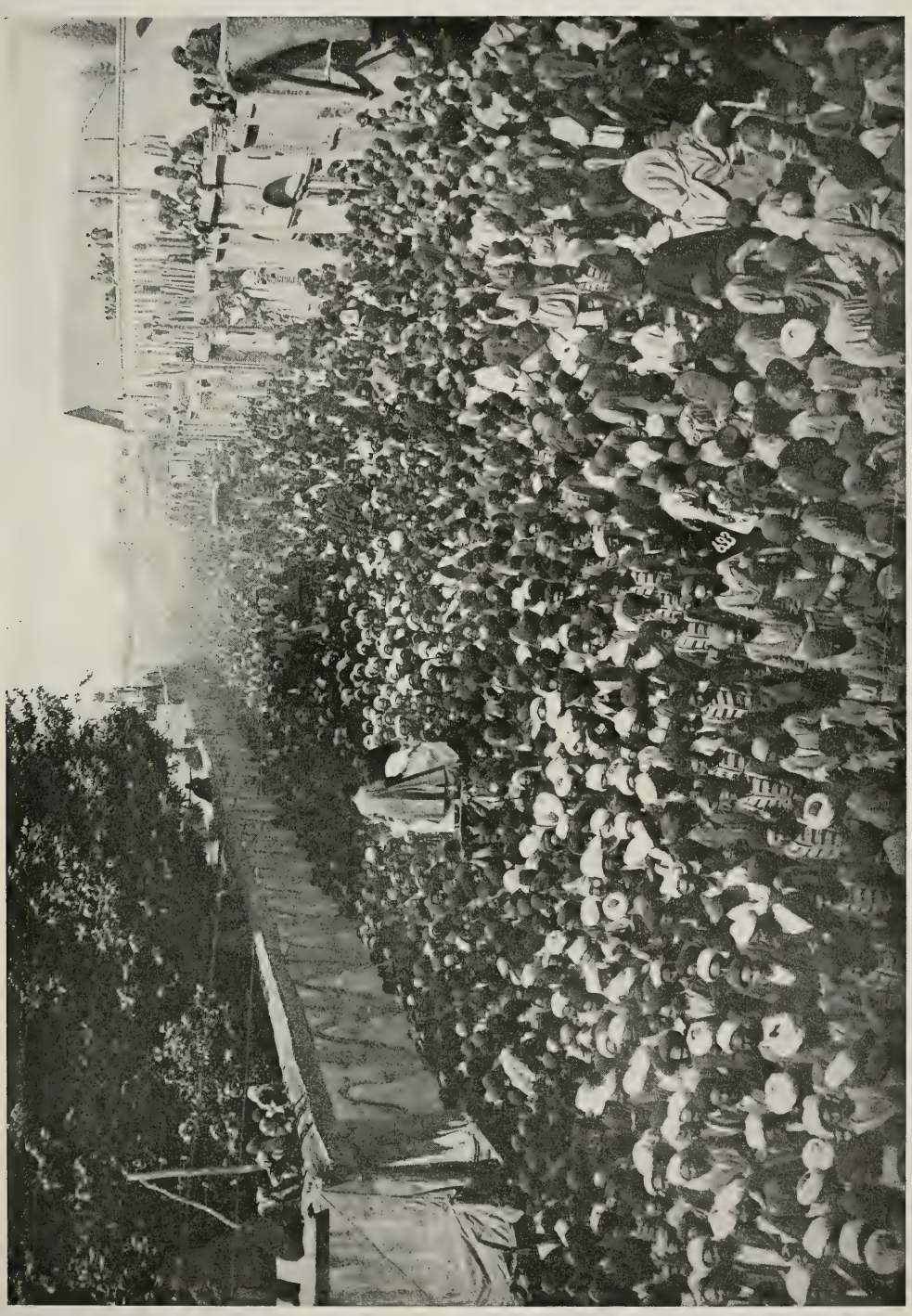
MOHAMMEDAN HIGH PRIESTS, LEADERS OF THE CONSTITUTIONAL REVOLT IN TEHERAN

To one unacquainted with Persia, the strangest feature of the recent revolution is the fact that the leaders in demanding a Parliament and other reforms were not the men who had traveled and studied abroad, but the priests and lawgivers. The Parliament and other rights were obtained without bloodshed (see pages 373 and 379).



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FUNERAL OF A PERSIAN HIGH PRIEST: TEHERAN

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COPPER VESSELS USED FOR THE COOKING OF FOOD FOR THE CONSTITUTIONAL REFUGEES AT THE BRITISH LEGATION

royal tribe), clergy, nobles, merchants, and tradesmen. These representatives will be elected by their peers. The national council shall deliberate on all important affairs of state, and shall have the power and right to express its views with freedom and full confidence in regard to all reforms which may be necessary to the welfare of the country. The result of the deliberations of the council shall be submitted through the intermediary of the First Minister of State to the Shah for His Majesty's signature, and shall then be carried into effect. The rules of procedure of the national council shall be drawn up with the approval of the members and shall receive the Shah's signature. The council, after determining its rules of procedure, shall then begin to give effect to the sacred laws of Islam and to introduce the necessary reforms."

Thus was accomplished, by an almost bloodless revolution, the same laudable ends that ended in disastrous failure, after months of rapine and outrage, just across the border in "civilized" and "Christian" Russia! Certainly an encouraging and instructive sign of the march of events in the "awakening East."

The first Persian national convention was made up of delegates from all over Persia, but most came from the northern provinces, where constant contact with the restless population of the Caucasus had familiarized the people with the principles of liberty and popular government. While not elected by popular suffrage, this body undoubtedly represented the will of the more enlightened and progressive inhabitants of the country, especially in the great centers of population, Tabriz, Teheran, and Ispahan.

RESULTS OF THE PARLIAMENT

Taking into account the extraordinary circumstances that made the first national assembly a possibility, and the apathy of by far the greater number of the Shah's subjects where their personal liberties are concerned, the work accomplished by the Persian Parliament after a little more than a year of existence is noteworthy and promising. As in past years, the financial condition of the kingdom leaves much to be desired.

The Shah's entourage have succeeded in shifting to the shoulders of the people's representatives the constantly recurring question of how to raise revenue with every natural resource long since hypothecated in favor of foreign creditors. It must be remembered, however, that Persia's unfortunate financial situation is largely the result of the follies and extravagances of a previous regime, and the present misfortunes that threaten the credit of the country have their root in reckless borrowing and improvidence, lasting over a period of twenty years or more.

Hopeful signs of internal improvement are noticeable all over Persia, especially in the northern provinces, where the towns and villages have taken steps to form local municipal assemblies modeled on European lines. Attempts are being made in many provinces to inaugurate a fair system of taxation, and the people are beginning to realize that the passing of the iniquitous system of tax "farming" means the beginning of a new era of prosperity for the poor as well as the rich.

Among other signs of the awakening interest of Persian people in the affairs of their country is the sudden and remarkable growth of the Persian press. In place of the old "Moniteur Official," Teheran can now boast of no less than four daily and thirty weekly papers. Most of these are rabidly progressive in their tone, nor can their influence be said to be wholly beneficial to the cause they support. Nevertheless it is a promising sign that the absolute apathy toward public affairs which was a characteristic trait only a few years ago is giving place to a new sense of social responsibility.

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A MOUNTAINEER OF SOUTH PERSIA, NEAR BUSHIRE, ON THE PERSIAN GULF

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AN ARISTOCRATIC YOUNG PERSIAN LADY

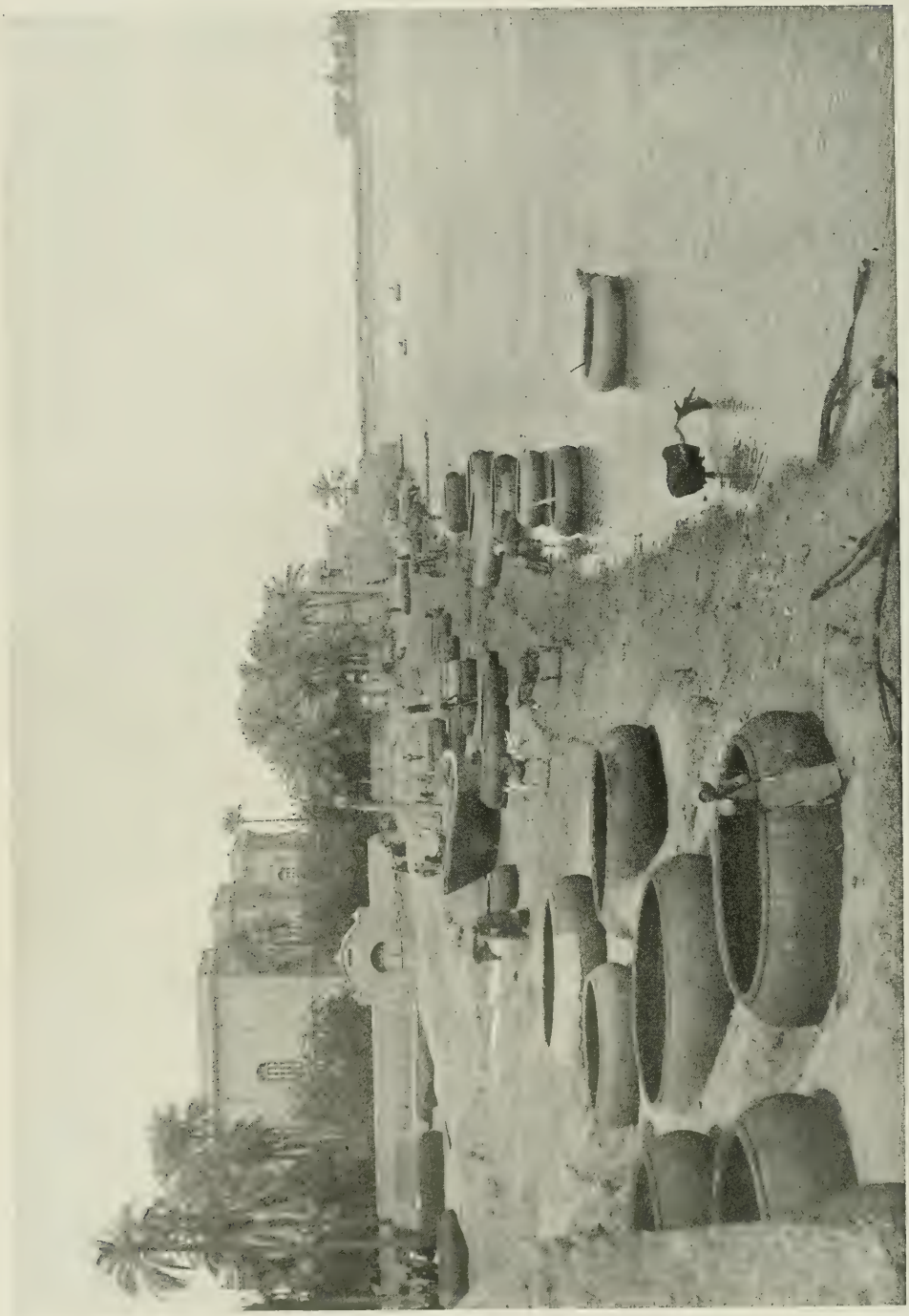

Photo from "Persia: the Awakening East," by W. P. Cresson

FERRY-BOATS AT BAGDAD, ON THE TIGRIS

Photo from "Persia: the Awakening East," by W. P. Cresson

ANOTHER VIEW OF THE BOATS USED AT BAGDAD

As shown in the picture, these boats are built of wicker-work and then covered with cement. They are propelled by long single-bladed paddles, usually one boatman to each vessel

OUTLINE MAP OF PERSIA

CONSERVATION OF OUR NATURAL RESOURCES

PRESIDENT ROOSEVELT has invited the President of the National Geographic Society, Dr Willis L. Moore, as its representative, to take part in the conference to be held at the White House in May for the Conservation of our Natural Resources.

THE WHITE HOUSE,
WASHINGTON, *March* 14, 1908.

MY DEAR SIR: Recently I invited the governors of the states and territories to meet in the White House on May 13–15 next in a conference on the Conservation of Natural Resources. In issuing the invitation I expressed the opinion that there is urgent need of taking stock of our resources, and I added my belief that the conference ought to take rank among the more important meetings in the history of the country.

The replies to the invitation have been most gratifying. They indicate that practically all the governors, each with three special advisers, will attend the conference. The Senators and Representatives of the Sixtieth Congress, the Justices of the Supreme Court, and the members of the Cabinet have also been invited to take part; and the Inland Waterways Commission, which suggested the conference, will be present to reply to inquiries and make record of the proceedings. A limited number of leading associations of national scope, concerned with our natural resources, will be invited to send one representative each to take part in the discussions. The general purpose of the conference is indicated on pages 24–26 of the preliminary report of the Waterways Commission.

I invite the coöperation of the National Geographic Society in bringing this matter before the people; and it gives me added pleasure to invite you as President of the Society, to take part in the conference.

Sincerely yours,
THEODORE ROOSEVELT.

President WILLIS L. MOORE,
National Geographic Society,
Washington, D. C.

Every student of geography keenly appreciates the importance of the conference called by the President, and hopes for lasting results from the meeting. The National Geographic Society for many years through its Magazine has endeavored to stimulate interest in the great natural factors and problems of this country. It is always glad to coöperate in any movement to conserve our animal, vegetable, and mineral wealth for future generations.

THE NOME GOLD FIELDS

IN Bulletin No. 328, just issued by the United States Geological Survey, Mr Alfred H. Brooks, in charge of the division of Alaskan mineral resources, describes the rapid industrial changes in Seward Peninsula, Alaska:

"A decade ago Seward Peninsula was little more than a barren waste, unpeopled except for a few hundred Eskimos and a score of white men; now it is the scene of intense commercial activity, supporting a permanent population of 3,000 or 4,000 people, which in summer is more than doubled. Then the igloo of the Eskimos and a mission were the only permanent habitations; now a well-built town with all the adjuncts of civilization looks out on Bering Sea, and a dozen smaller settlements are scattered through the peninsula. This region,

which then produced only a few furs, now increases the wealth of the world annually by nearly $8,000,000. A decade ago the only communication with the civilized world was through the annual visit of the Arctic whaling fleet and the revenue cutter; now a score of ocean liners ply between Nome and Puget Sound during the summer months, and even in winter a weekly mail service is maintained by dog teams. Moreover, military telegraph lines, cables, and wireless systems, and a private telephone system keep all parts of the peninsula in close touch with the outer world. Railways connecting some of the inland mining centers with tide-water traverse regions which a few years ago were almost unknown to white men. This industrial improvement is the result of the discovery and exploitation of gold deposits."

As there has been but one successful attempt at auriferous lode mining in this region, practically all the gold production—approximately $37,000,000 in the nine years from 1898 to 1907—has been taken from the placers, and it is the geologic and industrial history of these placers which is discussed in this report.

Compared with the output of the California placers, which are estimated to have yielded in two years (1851 to 1853) $62,000,000, and of the Klondike placers, whose output in the first decade is valued at $118,000,000, the production of the Seward Peninsula placer mines is small. A rough outline map in Mr Brooks's report illustrates approximately the relative size of the gold-bearing areas of the three regions and his comparison is most interesting:

"The auriferous gravels of California * * * probably cover an area about equal to that occupied by the auriferous gravels of Seward Peninsula, but the Klondike gold field is probably less than one-tenth as large. The California placers are not only ideally located for economic exploitation, but their gold content averaged no less than that of the Seward Peninsula gravels. Moreover, the high gravels of California are far more extensive than those of the Alaska field. With abundant water supply, steep stream gradients, heavy gravel deposits, accessibility, and salubrious climate, it is no wonder that the California placers far outstripped the northern field in the first years of production.

"The Klondike, on the other hand, is less favorably situated than Seward Peninsula, and its water supply available for mining is much less. It appears, however, that the placers of such creeks as Eldorado and Bonanza, in the Klondike, averaged richer than any deposits of similar extent yet found in the peninsula. It was the exploitation of these almost fabulously rich and relatively shallow gravels that brought the Klondike gold output up with a bound, and it is their quick exhaustion that has caused an almost equally rapid decline of the annual yield. There are still extensive bodies of lower-grade gravels to mine in the Klondike, but these can be developed only by means of extensive water conduits or by dredging. Mining in the Klondike has passed its zenith, whereas in Seward Peninsula the maximum yearly output is still to be reached.

"In the comparison of the Seward Peninsula placer fields with others, it must be borne in mind that probably three-fourths of the entire production has been drawn from the region adjacent to Nome and from Ophir Creek and its tributaries. Therefore, though the gold-bearing area is large, yet only a few square miles have been extensively exploited * * * and it is probable that it will be some time before the maximum yield will be attained."

The report from which the above extracts are made contains, in addition to papers by Mr Brooks, papers by Messrs A. J. Collier, F. L. Hess, and P. S. Smith. It includes several maps and other illustrations.

GEOGRAPHICAL CONGRESS

THE Geographical Society of Geneva has sent to the National Geographic Society a limited number of preliminary programs in French of the

Photo by E. D. Follwell, Korea

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Ninth International Geographic Congress, which will be held in Geneva, Switzerland, July 27 to August 6. Members of the National Geographic Society who are expecting to be in Europe the coming summer, and who would like to attend the Congress, will be furnished with copies of this program upon request. The delegates of the National Geographic Society to the Congress are Rear Admiral Colby M. Chester, U. S. N.; Prof. James Howard Gore, of George Washington University, both of whom are members of the Board of Managers; Prof. Simon Newcomb, Dr Anita Newcomb McGee, and Dr David T. Day, U. S. Geological Survey.

NEW TOPOGRAPHIC MAPS.

During January and February, 1908, the United States Geological Survey issued new topographic maps as follows:

State.	Quadrangle.
Illinois	Breese
Kentucky	Morganfield
Minnesota	Minnetonka
Ohio	Ravenna
Ohio-West Virginia	Pomeroy
Pennsylvania	Johnstown
Texas	El Paso
Virginia	Natural Bridge Special
West Virginia	Kenna
Do.	Keno
Do.	Otter
Do.	Walton

With the exception of the Minnetonka (Minn.), Natural Bridge Special (Va.), and El Paso (Tex.) sheets, these maps represent coöperative surveys made by the State and Federal governments.

Reprints were also issued of the following sheets, the first editions of which had been exhausted:

State.	Quadrangle.
Arizona	Kaibab
California	Sierraville
District of Columbia	Washington
Florida	Williston
Illinois	Dunlap
Do.	Ottawa
Maryland	Betterton
Mass.–N. H.	Newburyport
Missouri	Marshall
New Jersey–Delaware	Bayside
New York–Connecticut	Oyster Bay
North Carolina	Statesville
Pennsylvania	Millerstown
Tennessee	Louden
Do.	Morristown
Virginia	Roanoke

The maps listed above are for sale by the Survey at 5 cents each except the Washington sheet, which, being double the size of the others, costs 10 cents.

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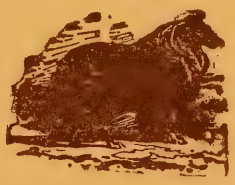

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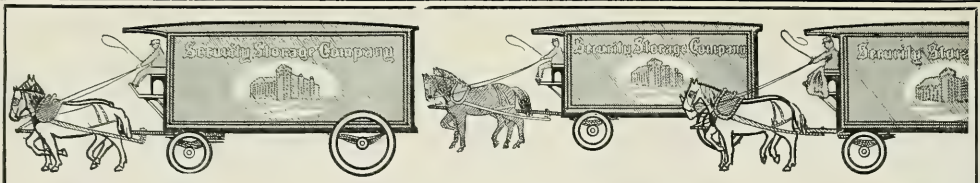

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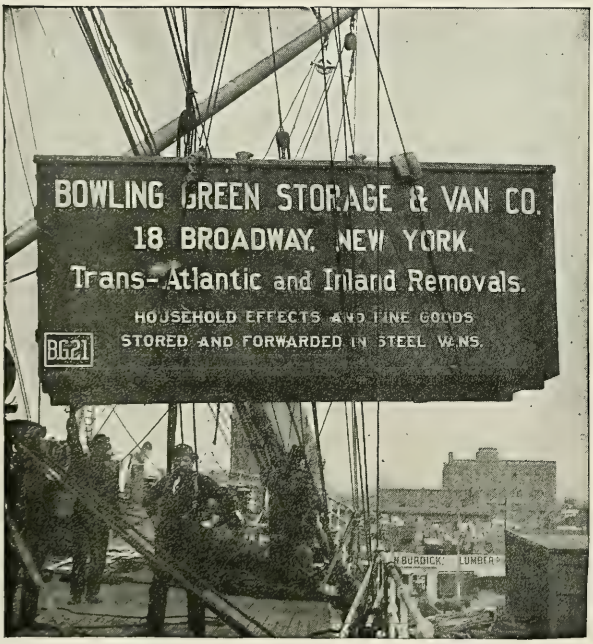
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THE NATIONAL GEOGRAPHIC MAGAZINE

ONE SEASON'S GAME-BAG WITH THE CAMERA*

By Hon. George Shiras, 3rd

Mr Shiras' achievements with the camera and the flashlight have encouraged many big-game hunters and field naturalists to adopt these methods of pursuing or studying wild life. When serving as a member of Congress Mr Shiras devoted much time to preparing or advocating measures designed to permanently conserve the birds, animals, and fish of our country. One bill putting under Federal control the migratory wild fowl and another extending governmental supervision over fish in the tidal waters, the Great Lakes, and interstate rivers, have received the hearty approval of the leading game and fish protective associations in the United States and Canada, while the author's extensive brief in support of such constitutional power has met with the approbation of many leading jurists and lawyers. Within the next year active steps will be taken to have these bills enacted into law.—Editor

ABOUT two years ago the writer contributed an article to the National Geographic Magazine upon "Photographing Wild Game with Camera and Flashlight,"† the purpose of which was to show what an admirable substitute the camera is for the gun in the skillful pursuit of wild life and in the capture of trophies much more enduring and attractive to the hunter, his friends, or the public, than where the animal or bird paid the forfeit of its life in the game of hide and seek.

The old doctrine of the frontiersman, trapper, explorer, or remote homesteader, that the edibility of certain wild creatures justified their destruction, was and is still a rational one, when we consider how human life has been sustained or the otherwise limited larder of those in the wilderness bountifully varied by the moderate taking of game animals and birds. To a considerably less degree we may ascribe some reason to the thrifty market hunter who turns his ducks into dollars or moose meat into money, since he seldom kills or abandons a mountain of flesh for the sake of a pair of antlers or for the temporary gratification of an accurately placed bullet in an animal so tough or so remote from civilization that its flesh cannot be utilized.

But how about the modern sportsman who hunts for the love of sport and the freedom that comes with a trip into the wilderness? Are the antlers of an abandoned and festering stag to be recognized as a trophy of unsullied honor,

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†With 72 illustrations, July, 1906.

while the blood-flecked coin of the market hunter is to be regarded as the token of sordidness?

When fagged, overcivilized, not to say overfed, man seeks the solitude of the forest, he goes neither in search of food nor from a barbaric desire to see gaping wounds and a pitiful death struggle of some mighty beast. The exhilaration and the delightful freedom of the wilderness, with an opportunity to pit man's dexterity and resourcefulness against the experience, strategy, and inherent cunning of the hunted, accounts in these later days for many an unnecessary tragedy in the woods.

A tithe of what one spends in time and travel will supply the household with flesh or fowl that is generally superior to the game sought, or one can buy at half the cost the skins or horns that later may adorn the home as a result of the hunting trip.

Every decent sportsman who now hunts big game in particular, and many of those who seek a smaller quarry, are moved by qualities directly opposed to needless suffering or useless slaughter; and it is unfortunate that to many of these the peep-sights of a rifle must continue to circumscribe their vision. Some time it will be recognized that, when the camp is abundantly supplied with wild food, the camera, and the camera alone, should be the means of further hunting; for skill, not kill, is the motive, except in the predaceous class, like the wolf, the cougar, or the crow.

THE CAMERA DISPLACING THE SPORTSMAN'S GUN

From his accurate knowledge of wild life and under the prestige and authority of his high office, President Roosevelt has done more to permanently conserve the wild animals and birds of this country than any man now living. The setting aside, under executive order, of a great many game refuges and dozens of islands as breeding places for wild fowl and sea birds—on the coasts, on the Great Lakes, and in the distant waters of Hawaii—has led to remarkable results and will save many a rare creature now verging on extinction. Originally an intrepid pioneer, who only collected a fair toll in a fair way from the hills and plains near his western ranch, he has not in the past 14 years killed a single harmless wild animal, confining his brief trips to a study of the fauna of the Yellowstone Park, or to participating in lively chases after the wolf, the bear, the lynx, or the cougar, whose destructiveness have put them in the "predatory" class of which we have heard so much of late.

The President many years ago wrote the following as an introductory to a book of wild life illustrated with the camera:

"I desire to express my sense of the good which comes from such books, and from the substitution of the camera for the gun. The older I grow, the less I care to shoot anything but 'varmints.' * * * If we can only get the camera in place of the gun and have sportsman sunk somewhat in the naturalist and the lover of wild things, the next generation will see an immense change for the better in the life of our woods and waters."

And this is the man, who for many years has killed no innocent thing, and who, sportsman originally as he was, has become the leader in the preservation of wild life and in the advocacy of those means for best studying and enjoying it, that has been pointed out as one not now in "sympathy" with present nature fakers or their well-meaning but deluded followers!

It is only in recent years that the quick plate, rapid shutter and lens have made possible successful hunting with the camera, and even then it has required time to show the extensive field, the fascinating character of the pastime, and the sentimental and practical features involved in this method of studying and picturing wild life.

Although the writer was an ardent hunter from early youth, and pursued in the most relentless way those varieties of birds and animals whose cunning and whose conquest made them worthy of the name of "game," it must not be assumed that he, with the usual zeal of a convert, now indiscriminately decries the man with the gun; for, under proper conditions and in moderation the tenant in the wilderness camp is entitled to his

share of nature's bounty; nor is the writer in accord with the paved-street nature lovers who would sanctify as God's creatures the wild deer and the wild sheep, and yet see no inconsistency when entering an indignant protest if, forsooth, a joint of lamb is tough, simply because the little creature's gambols in the spring were too prolonged!

In the previous article, already referred to, the writer used, so far as possible, illustrations intended to show the wide scope of camera hunting, ranging from the gigantic bull moose to the bull-frog; the graceful deer to the tiny deer mouse; the sleeping bird upon the nest to the rapid flight of wild fowl speeding seventy-five miles an hour before the blind. Then, too, it was shown that all is game to the camera, irrespective of edibility; that you can still hunt your game—shoot it on the wing; set your camera out like traps; hunt any season of the year, in daylight or in darkness; have admission to lands closed to the man with the gun, and never be limited by law or custom in the size of your game-bag.

The fact that the taking of these pictures covered a period of more than twenty years has led the writer to prepare the present article. Many previous readers reached the conclusion that wild game photography was so difficult and uncertain that while it was possible for a few persons devoting half a lifetime to such a pastime to gather together an interesting collection of pictures, yet to the ordinary sportsman or amateur photographer the prospects of getting satisfactory results in the vacation periods of each year were too remote for their consideration.

Therefore the present illustrations are selected from among two hundred and fifty photographs taken within the past year, or, to be more precise, from April 9, 1907, to April 1, 1908, and represent four trips in which the camera was in use a total of thirty days, aside from the time of reaching the game fields.

WHERE THE AUTHOR "HUNTED" THE PAST YEAR

Having had a permanent or base camp every year since a boy on the south shore of Lake Superior, much of my big-game hunting with the rifle or camera has been in the middle West or central Canada; but in the present instance, with few exceptions, the photographs represent two extremes on the Atlantic coast. One trip, in April of last year, was to an isolated coral reef, called Cay Verde, belonging to the Bahama group and situate about 230 miles south of Nassau, where we located the only large, and possibly the only existing, breeding colonies in eastern waters of the man-o'-war birds and boobies; another expedition, in July, was made to New Brunswick after moose and deer, while later in the season the Gulf of Saint Lawrence was revisited and crossed to the Island of Newfoundland to picture the fall migration of the caribou; and the fourth and final trip was made this spring, to Florida waters, for a further study of the brown pelicans, and other local birds. As will be noted, no distinction was made between game and non-game animals and birds in these recent expeditions.

AN EXCITING VOYAGE IN WEST INDIA WATERS

In company with Mr Frank M. Chapman, the well-known ornithologist, the voyage to Cay Verde was made from Miami in the trim little schooner yacht *Physalia,* of the Carnegie Institution of Washington, and under the command of that experienced navigator and naturalist Dr. A. G. Mayer, director of the Dry Tortugas Laboratory. At first sight the *Physalia* seemed small and low in the water for a thousand-mile trip in the Bahamas. It was fifty-five feet over all, with a graceful and extended overhang in the bow and stern that reduced the keel measurement to only twenty-five feet. The draft was five feet and the main deck about three feet above the water line. The masts, however, were long and very massive; but, alas, several days later these selfsame masts became an additional source of danger, as the little yacht, lying on her beam's ends in a fearful gale, was endeavoring to recover her equilibrium. In addition to the sails, there was a twenty horse-power gasoline engine for use in making diffi-

cult harbor entrances or fighting against the treacherous tides of the Bahama Banks.

The voyage across the Gulf Stream to Nassau and the first day's run south from that port was interesting but uneventful. On the second day, April 1, 1907, conditions changed, when a heavy head wind was encountered from the south, displacing the customary easterly trade winds. For hours the yacht tacked back and forth in a futile contest with wind and waves, for going to windward was not the *Physalia's* strong point. At 4 p. m. the anchor was dropped on the north side of a narrow reef lying east and west, which promised fair shelter for the approaching night; but at this very moment the destructive hurricane of April 1 had just struck Nassau, fifty miles to the north, and was tearing its way against the southern gale, which we were contentedly watching as it sent the spray high over the reef in front of us.

The barometer, however, had begun to fall and, not liking the looks of the weather, with ominous thunder clouds gathering, another anchor was dropped overboard, only to find ourselves struggling at the windlass half an hour later to pull them back again, as the hurricane came from the north while the tumultuous waves threatened to pull the bow under, held as it was with double chains, or later drive us back upon the reef when anchor free.

As the second anchor came aboard, the yacht responded quickly to the wind, and in passing out struck a sunken bar of sand or silt, hanging just long enough for a huge wave to sweep the decks and flood the engine-room, stopping the motor, upon which we were relying until a small sail could be reefed. The next wave carried us clear, and in a few minutes the engine was again running, and then began a struggle to clear some long, low islands ahead which could be dimly seen in the gathering darkness. This required us to run at right angles to the gale, in the trough of the sea, and then it was that the huge masts laid us over again and again, tearing the life-boats from the davits and upsetting things generally.

Darkness now came on, accentuated by flashes of lightning, and after a run of half an hour it was hoped we had cleared the islands to the left; so, to the partial relief of all, the rapidly foundering yacht was turned free with the wind, and then commenced an all-night's run through a network of coral reefs and shallow bars which for six hundred miles formed the easterly fringe of the Bahama Banks. The night being impenetrable, no lookout was placed at the bow, but every minute or two the lead was thrown, and when occasionally the Swede mate called out "Vun faddom," we knew that but a single foot of water lay between the keel and some jagged reef. But here I shall omit the suspense of the next four hours.

At midnight the gasoline tank broke and the little cabin was flooded with gallons of volatile oil. With a rush all the lamps were extinguished, including the binnacle light, illuminating the deck compass, and just in time to prevent sudden annihilation. The possession of a little electric pocket-lamp made it possible to see the wheelman's compass until, after an hour's effort, with a barricade of canned goods carried from the hold to the deck, we succeeded, in the howling gale, in lighting a marine lantern.

At 4:30 a. m., in the first gleam of the coming light, the pilot made out a high and rocky island a quarter of a mile to the east, and in a few minutes he skillfully guided us into a narrow entrance of Upper Gold Ring Key, ninety-one miles away from the anchorage of the night before. Here, in a spirit of thankfulness, we remained for two days, until the gale passed away, repairing the broken life-boats and pumping out the gasoline from the bilge, during which time we cooked our meals on the shore of the key, for the yacht was still filled with the sickening and dangerous fumes of gasoline. And how bright and lovely those scarred rocks and tangled thickets seemed! On board everything was thoroughly drenched except our precious plates, which fortunately had been put up in water-tight tin cans.

WRECKERS EYEING THE PHYSALIA WITH INTEREST

It may be remarked that this was the first hurricane at such an early date for nearly twenty years, and, with a wind pressure of more than eighty miles an hour, it beached, sunk, or dismantled a large number of vessels at Nassau and in our vicinity.

But let no inexperienced one suppose that this unusual adventure of the *Physalia* is typical of life on the sea, or that he who seeks the remote forests or the open waters is leading a life of danger and of hardship, for the dangers of the crowded city far exceed in number and variety those of the former. "The perils

THE PHYSALIA ON A REEF (SEE PAGE 402)

CURLY TAILED LIZARD, CAY VERDE

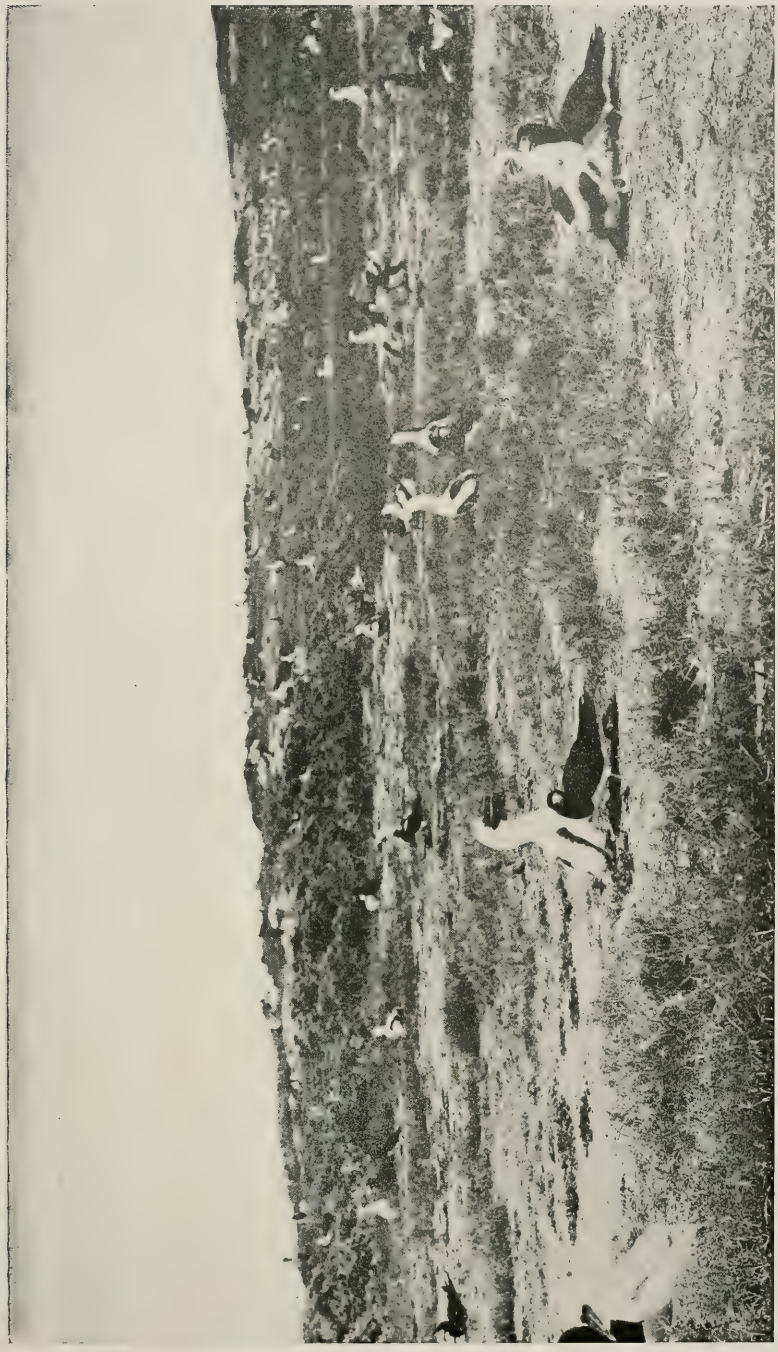
RESTING AFTER THE HURRICANE ON UPPER GOLD RING KEY: AN ABANDONED NEGRO HUT

GENERAL VIEW OF BOOBY AND MAN-O'-WAR COLONIES

The latter in the dark cactus thicket in the left foreground; *Physalia* at edge of the surf. The man-o'-war birds are pirates among birds, obtaining much of their food from the stupid boobies, without whom they probably could not live on this island (see page 400).

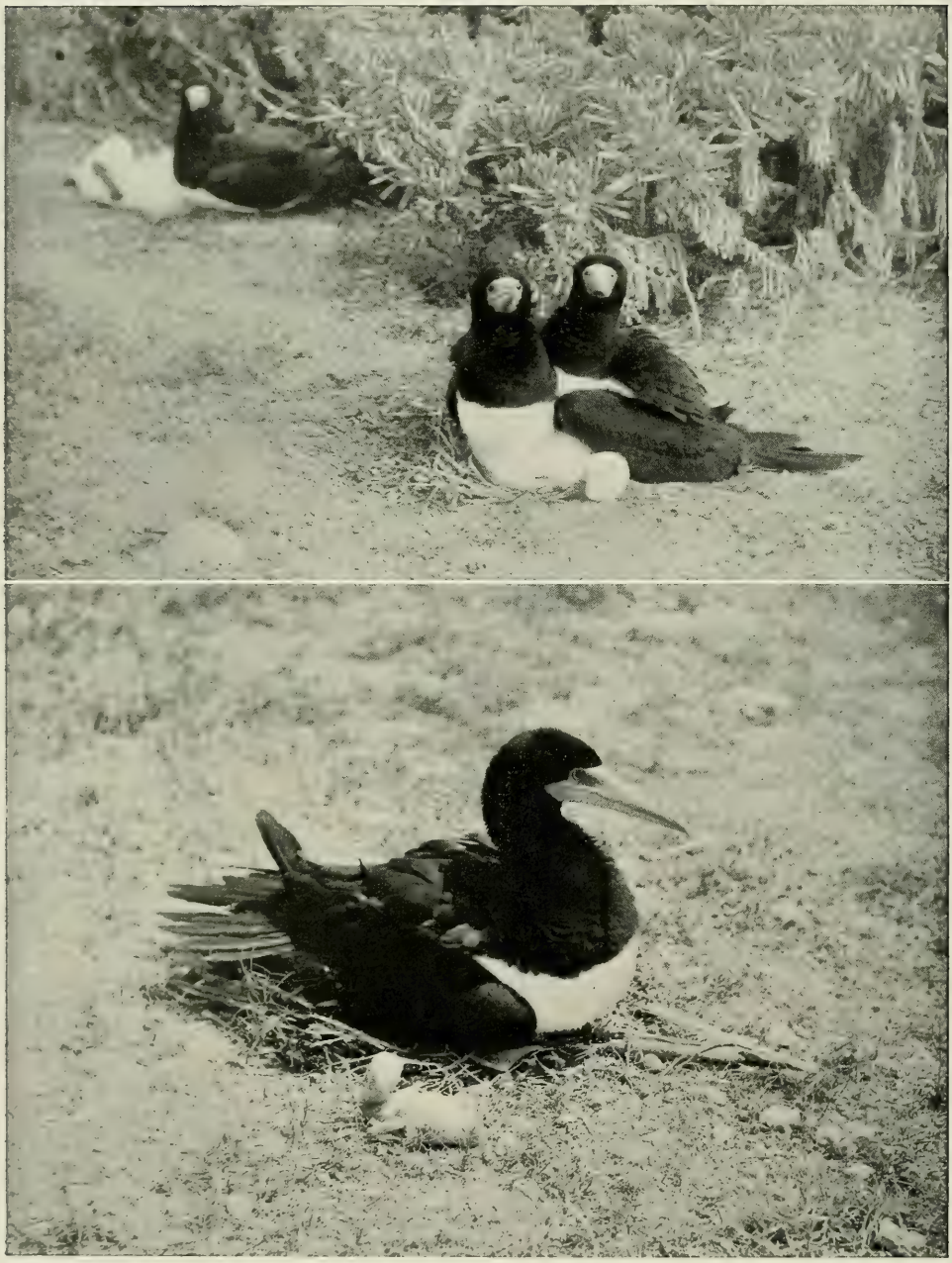
BOOBIES ON CORAL CLIFF, 75 FEET ABOVE THE SEA, ONE OF THE HIGHEST CORAL CLIFFS IN THE BAHAMAS

The booby or black gannet is a maritime bird found on both oceans, with a range on the Atlantic coast confined to tropical and sub-tropical America. It inhabits lonely islets and in flight resembles both the cormorant and the gull, but in fishing strikes the water at a low angle, emerging against the wind. The adult has a white breast and the rest of the body is a beautiful soft, dark brown; the young are white at first, shading gradually into gray and the final brown of the parents. The feet are webbed, of yellowish hue, and the odd wedge-shaped bill is a green-yellow or a pink-yellow, according to sex. When approached closely they bow in a dignified manner and manifest great affection for their young.



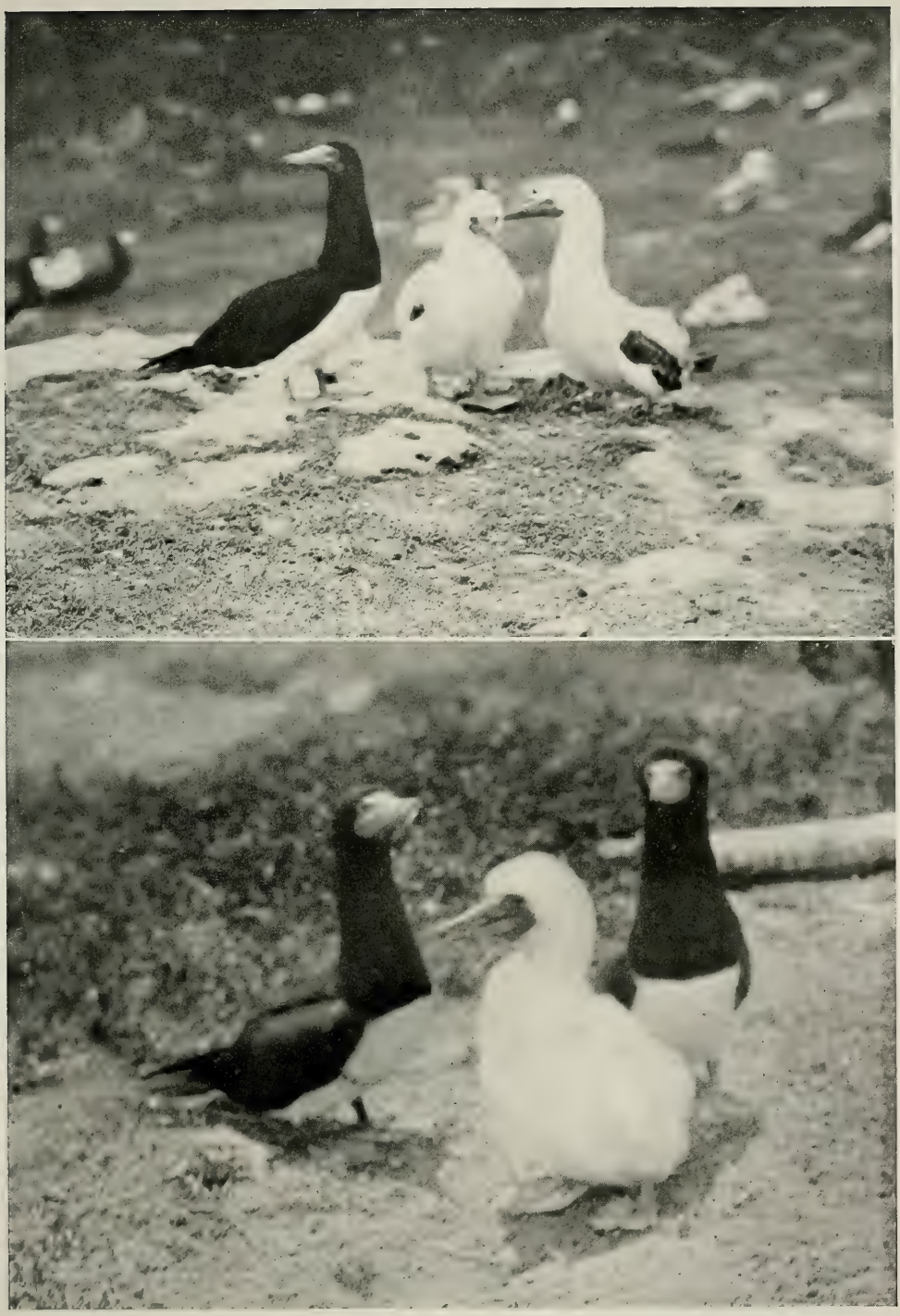
WESTERN PART OF THE BOOBY COLONY, ON THE ELEVATED PORTION OF THE ISLAND

The white bird is the young and the black the adult



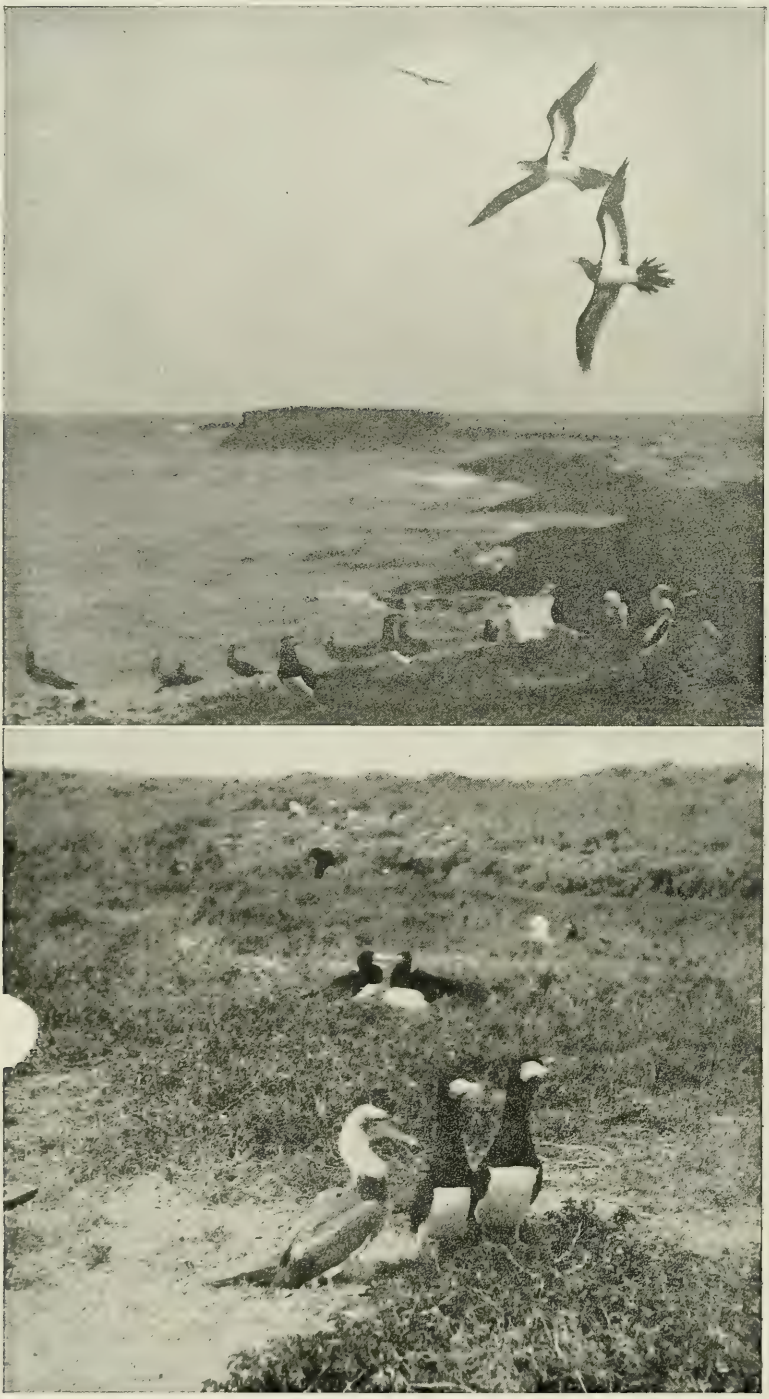
PARENT BOOBIES COVERING YOUNG FROM DIRECT SUN HEAT OF 130 DEGREES

NESTING BOOBY: WITH YOUNG DISPLACED IN FOREGROUND



ONLY YOUNG TWIN BOOBIES NOTICED IN 700 NESTS

THE PARENT BOOBIES STAND GUARD ON EITHER SIDE NIGHT AND DAY, EXCEPT WHEN SEARCHING FOR FOOD



BOOBIES IN FLIGHT: NOTE FAN-TAILS

YOUNG BOOBY IN FINAL GRAY PLUMAGE JUST BEFORE CHANGING TO ADULT

MAN-O'-WAR BIRDS SOARING 100 YARDS OVERHEAD ON MOTIONLESS WINGS

of the deep" is a most misleading phrase. It is the peril of the shallows, of the reefs, of the fog-bedimmed coast, that makes navigation sometimes dangerous and uncertain. Not too much wind, however great, but too little water, is the cause of nearly every disaster upon the sea.

The loss of all the gasoline except a few gallons remaining in the bottom of the ruptured tank delayed the expedition many days, and instead of a return to Nassau within a week, nearly a month elapsed before the trip was over.

The following week, a hundred miles farther south, we spent several days at Ragged Island awaiting favorable conditions for visiting Cay Verde, more than thirty miles out of sight of land to the east and upon which a landing could only be made when a light wind prevailed, for calm days were now unavailable, with the gasoline practically gone, and heavy winds meant insurmountable breakers rolling in upon the small sand beach at Cay Verde.

Finally, on April 8, with a light head wind, the *Physalia* slowly tacked its way toward our goal, and late in the afternoon, when within three miles of this little island, the wind died out and it became necessary to use several gallons of the remaining gasoline in order to make a landing before dark; and a fortunate move it was, for the next day a heavy wind prevailed and would have prevented landing upon or departure from the reef.

But miles away and long before the boats were launched and loaded we had been anxiously eying the reef for signs

BREEDING COLONY OF MAN-O'-WAR BIRDS

Old black bird on nest and young white birds scattered through thicket. The nests are built on sea-grape bushes surrounded by impenetrable cactus

of bird life. Our data was not at all encouraging, since such as we had only established the existence of bird colonies in 1857 and 1896. Whether the birds had been there this season or, if so, had been broken up by the rather unusual visit from some becalmed ship, we did not know.

Schooners carrying fifteen or twenty dories and a crew of twenty or more negroes are continuously searching the shallow waters of the Bahamas for sponges, and, as might be expected, have from time immemorial made a practice of landing upon islands for birds' eggs and their young and, when possible, taking the breeding birds themselves, with the result that in recent years bird life in the Bahamas is threatened with extinction. Some of the readers may recall Mr Chapman's efforts, covering three seasons, to locate on these islands a breeding colony of the beautiful pink flamingo, and how at last he succeeded, after discovering a breeding site many miles in the interior, on a large marshy island and so remote as to have escaped the vigilant eyes of the watchful natives.

The extreme isolation of Cay Verde and the absence of protecting land in the neighborhood make the landing too uncertain to warrant a trip that far in search of eggs or young.

However, as the yacht approached a little nearer we noticed high over the island the graceful, soaring flight of several man-o'-war birds, and later could see, coming from all directions, small numbers of boobies, bringing in their pouch the evening meal for their clamorous offspring, provided they were not intercepted in mid-air and compelled to disgorge for the benefit of that hawk of the sea, the man-o'-war bird, whose diet consists wholly of flying fish or the toll collected from the good-natured boobies, the presence of which alone makes possible a certain supply of fish for the young of its piratical neighbor.

YOUNG MAN-O'-WAR BIRD AT CLOSE RANGE

The man-o'-war or frigate bird belongs to the inter-tropical seas. They have a greater expansion of wing in proportion to the weight of the body than any other bird, and in power of flight are unsurpassed, soaring for hours at a great height, often far out at sea. They live on flying fish or by robbing the boobies, gulls, and terns. The long, narrow, powerful bill has at the end a horny hook, in appearance and substance like a talon, while the feet, from lack of use, are small and atrophied. The male is a brilliant black and has a concealed pouch of red skin which, when inflated, resembles a toy balloon; the female is brownish black with a splotched breast of white. The single young is white with black wings, and always stands erect in the nest.

Just as the tropical sun was sinking, the *Physalia* crossed the crimson sheen and dropped anchor off the pretty little sand beach mortised in between black and jagged battlements of æolian rock, which in broken masses circled the rest of the island. Quickly a large cask of water and a box of provisions were sent ashore for use, in case we were marooned by the forced withdrawal of the yacht under stress of weather, and later disembarking with our cameras, we landed for a three days' visit. A shelter for the night was made from an old sail supported by our tripods, and then Dr Mayer returned to the rolling vessel with a calm and satisfied demeanor, while we secretly rejoiced at having solid ground beneath our blankets, hard as it was.

In the fading light Mr Chapman and I stood by the little tent, gazing with curiosity and pleasure upon thousands of dark-colored boobies, who in stolid silence stood upright on either side of their single white-plumaged young, many of them not ten feet away from the edge of the tent, while still farther away we could see the circling man-o'-war birds descending for the night to nests scattered throughout a low thicket, composed of sea-grape bushes and spiny cactus. At sunrise we were up, and before attempting breakfast made a hasty trip to the higher part of the island and with field-glasses carefully studied the birds, mapping out our plan of action.

Our investigation then and later showed the island to be about thirty acres in extent and containing more than 4,000 ground-nesting boobies and five or six hundred man-o'-war birds in the sea-grape thicket, each colony in the midst of its nesting season. The pictures and subjoined text will tell without further words just what the camera saw, though the remarkable fact may be stated that while the booby nests usually contained two eggs, we were unable to find more than one pair of young in any of the hundreds of nests examined—due, as we discovered, to the peculiar fact that there was a difference of at least ten days in the incubating eggs, and that therefore the first young hatched would alone survive. The man-o'-war birds, on the other hand, lay one egg and, unlike the boobies, the nests are placed far back in the almost impenetrable jungle of cactus.

Several times the *Physalia* changed its anchorage, as heavy winds came on and on one night in particular we were much alarmed when in the midst of a violent thunder-storm the lights upon the *Physalia* disappeared, occasioned, as we discovered on the next day, by the violent rocking of the vessel. At the end of the third day our work was done, including the taking and preparation by Mr Chapman of a splendid group of both variety of birds for the American Museum of Natural History; and then began the slow journey back to Nassau. Delays were numerous, but none were serious until the night of April 16, when for the only time, aside from the night of the hurricane, we attempted a several hours' run with a fair wind and a full moon, in order to reach Nassau next day if possible, where and when the last steamer of the season left for Miami. At 11 p. m. the yacht suddenly stopped, the masts shook violently, the sails flapped, and behold—we were upon a reef, at high tide, a mile out of our course, through the treacherous currents of these broken waters.

At daybreak, when the tide was low, we found ourselves perched on a sand bar in six inches of water, with a deep channel on either side. The wind remained light and with a large island a mile to the east the boat alone was in danger should the wind increase. Here we remained three days, working like beavers at the windlass in an effort to drag the yacht into deep water, but not until the boat was stripped of all her ballast, provisions, anchors, etc., did we succeed in getting her off, in high water, at midnight of the third day; and, as an example of our former good luck, it may be stated that the bar we struck lay just ten miles south of where we began the all-night run on the night of April 1st. The next day we reached Nassau, too late, of course, for the Miami boat, and were compelled to return by water to New York on a Ward line steamer.

MALE AND FEMALE MAN-O'WAR BIRDS FLYING OVER SEA GRAPE THICKET: NOTE WING ACTION AND FORKED TAILS

FIVE NESTS OF MAN-O'WAR BIRDS IN A RADIUS OF SIX FEET: THIS BIRD HAS BUT ONE YOUNG

MAN-O'-WAR BIRD DESCENDING ON NEST: NOTE REMARKABLE FORWARD WING MOVEMENT

FEMALE MAN-O'-WAR BIRD: SHOWING EXTREME EXTENT OF ITS WING, 8 FEET FROM TIP TO TIP

AFTER MOOSE AND DEER IN NEW BRUNSWICK

During the first week in July, 1907, I spent a pleasant week in New Brunswick hunting moose and deer with the camera and flashlight. Although I had traveled through this famous game country a number of times en route to Newfoundland, previous plans had prevented a visit into its wilds.

In company with Adam Moore, the famous guide, trapper, and woods philosopher, we ascended the Tobique River seventy miles to its head-waters, Nictau Lake. Heavy and almost continuous rains the previous month had kept the banks full, or, as Moore expressed it, at a "logging stage"—a most unusual condition for a mid-summer month. The Upper Tobique is peculiar in that it has no rapids, no falls, and no slack waters, excepting an occasional salmon pool, for some sixty miles; yet it is one of the swiftest streams I have ever attempted to paddle. I say attempted, for the grand rush of this stream, supplemented by unusually high water, made the bow paddle useless, and all our motor power was concentrated in a ten-foot pole shod with steel, which Moore, a giant in stature and avoirdupois, standing aloft in the stern of the canoe, wielded with an expertness and strength that slowly but surely overcame a current against which four paddlers would have succumbed. Aside from a sudden dash from one bank to the other in order to escape water at times too deep for the shoving pole, no paddles were used in the three days taken to ascend the stream.

Did space permit, much might be written on the beautiful scenery, the moose and the deer crossing ahead of us, but beyond the camera range, on the slow contest with the current, or the attractiveness of the camp each night with the appetizing trout that lived to enjoy life until the blazing campfire was the signal for casting the artificial fly across this spring-fed stream.

Two days later, as we entered the narrow connecting creek between Lower and Upper Nictau Lake, Moore, scanning the stream carefully, remarked, "there were plenty of moose in the water today." Although I had hunted moose for many years, I neither observed any disturbance in the muddy bottom nor any tracks upon the bank, having failed to observe that floating here and there upon the current were numerous gray-brown hairs shed by the moose as they fed on the aquatic plants in the adjoining lake. A few minutes later we reached Moore's cabin, situated in a secluded corner, at the lower end, where a view of the entire lake was possible. And here, on the well-cleared bank, with a more or less continuous smudge, we were able to fight the sand fly, black fly, and mosquitoes, and yet be in a position to enter the canoe in a moment should a moose appear.

The next day was dark, warm, and wet, while it fairly rained moose; and their utter disregard of dampness was noticeable from the fact of their wading out in the deeper portions of the lake, where they would go entirely out of sight after the roots of acquatic plants. But the moose is so dark in color and its movements so rapid when chased by a canoe that I refrained from attempting to picture them under such unfavorable conditions.

The following days were more propitious, though showers fell occasionally. Many times during the day we silently paddled along the dark-fringed shores until close enough to a feeding animal to overtake it by rapid paddling after we had been finally discovered. Like all the deer family excepting the antelope, the moose has a poor and undiscriminating eye, depending upon its keen nose and sense of hearing for protection, and therefore when the head was frequently submerged it was not hard to approach with a canoe. During the next five days a dozen or more pictures were taken by this means, several of which are shown in the present article.

But when I returned each afternoon to camp it was only to prepare for a much more exciting camera hunt after darkness shrouded this little lake. At about 9 p. m. smaller lenses were substituted for the large ones used in daylight work, and, entering the canoe with the

jacklight in the bow and the flashlight apparatus in easy reach, we paddled along the dark and silent waters, while the canoe with its single blazing eye, was seeking out some nocturnal denizen along the shore or out in the deeper waters of the many bays.

Until the first night under the jacklight, Adam Moore simply thought camera hunting an interesting but not unusual pastime, for he had studied these animals for many years in the waters and in the forests of his native place. But when, on the first night out, his keen ears detected the wallowing of a moose at the edge of a small bog and later saw its bright, translucent eyes and its massive body, illuminated by the funnel of light from the jack, he grew intensely interested; and when the flash was fired and the great beast struggled about, blinded but not really alarmed, by what was taken to be a flash of lightning, Moore laughed long and loud. Every night thereafter he was the first in the canoe and impatient for the start. Here again the pictures must largely tell their story, for space forbids a detailed account of the many exciting scenes during the daylight and night bombardment of the New Brunswick moose.

When I parted from Moore on the Lower Tobique, the following week, he said: "In my varied experience and with many scenes before me, I can only say in all sincerity that the hunt of the past week has proved more interesting, more exciting, and of more real value in the study of animal life than all that has gone before." And this from a man who has looked over a rifle barrel for more than forty years!

THE REPUTED BELLIGERENCY OF THE BULL MOOSE

A prevailing impression shared in, alike by expert and novice, is the belief that the moose—especially the bull—will deliberately charge the jacklight of the night hunter, and in many portions of Canada and the United States I have been urgently advised against trying to take flashlight pictures of this animal from a canoe at night. I recall with marked distinctness an incident of many years ago when a hunting chum of mine came back from northern Minnesota, where with one of our oldest guides in charge of the canoe he had fired at a big bull moose from under the jacklight, and how, with the jack overboard, and a big hole in the bottom of a canoe, they spent the rest of the night on the banks of the muddy marsh, vowing never to fool with a moose again under such circumstances.

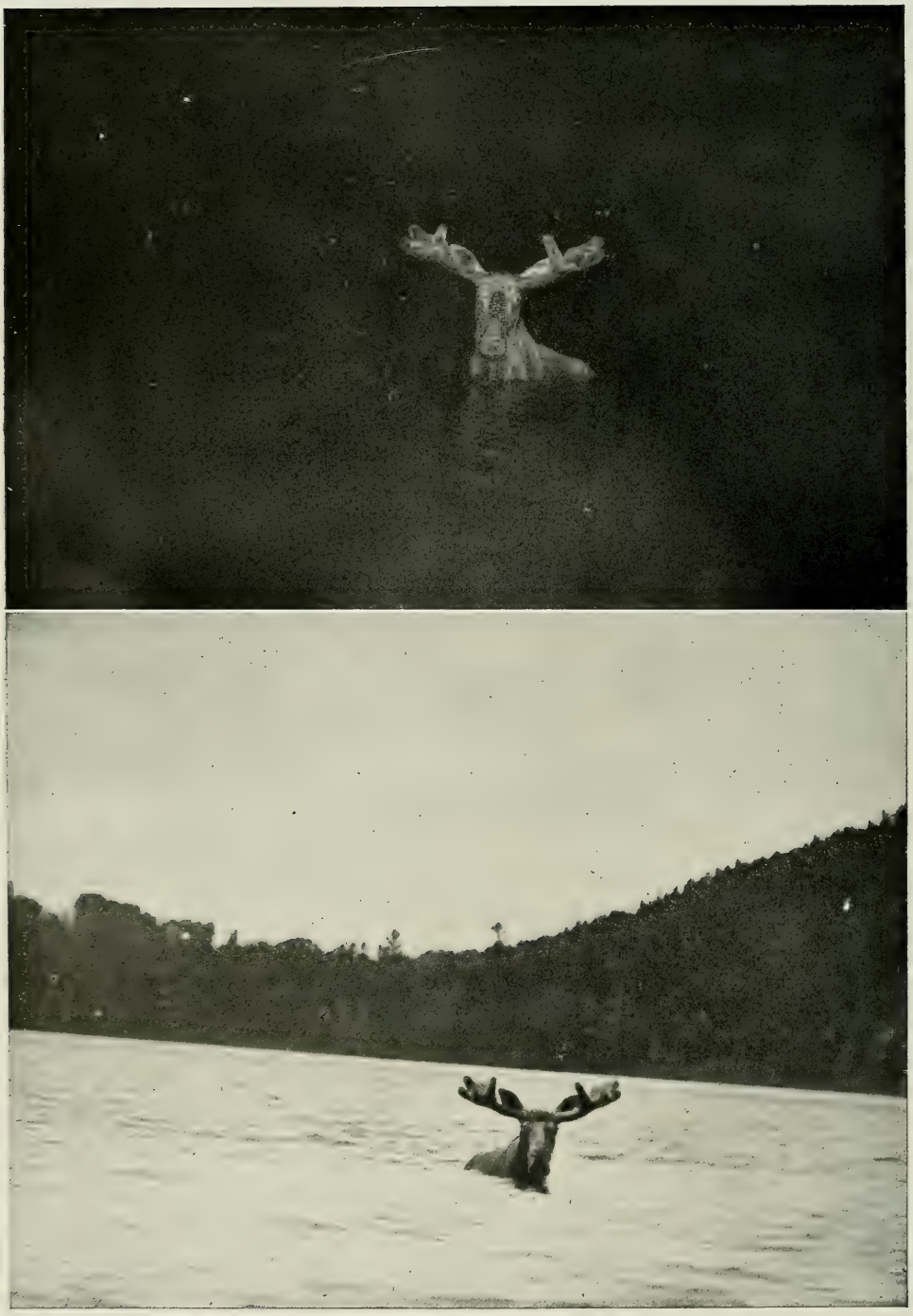
But long before going to New Brunswick I had discovered that much was fallacious in this theory, though somewhat mystified by some of my experiences. It so happened when the first moose was flashed (a disreputable looking old cow) it left the bank, bore down on the canoe, knocking both cameras overboard by striking the projecting table, and passed out in the darkness of the lake to be seen no more. And then the guide, who for many years had skillfully wielded the stern paddle in many of my flashlight expeditions, and who had absorbed the many tales of the nocturnal savagery of the moose, remarked, as he looked over his shoulder nervously, "If an old cow like that can act so, then there will be something doing when we meet a bull," or words to that effect. And I speculated too, as the cameras were picked up, sustained in the water by the air-tight bellows; and then the dampened negatives were hurried back to camp for immediate development.

What would happen we learned the following year in the Wahnapitae Lake district of Canada, when one night as we searched for moose in a long, narrow slough, a big animal was heard feeding in the water at the edge of the marsh where pond lilies grew in profusion. As the light slowly disclosed the half submerged body, we saw a big bull moose facing us, his jaws working energetically as he crushed the roots of a lily, dragged from the bottom of the pond. He looked rather fierce and the convulsive movement of the jaws heightened the effect. It was only after repeated signals from me that the canoe came cautiously within

A CONTRAST: OLD BEDRAGGLED COW MOOSE INDIFFERENT TO APPROACHING CANOE
MAGNIFICENT BULL MOOSE IN ACTION: NICTAU LAKE

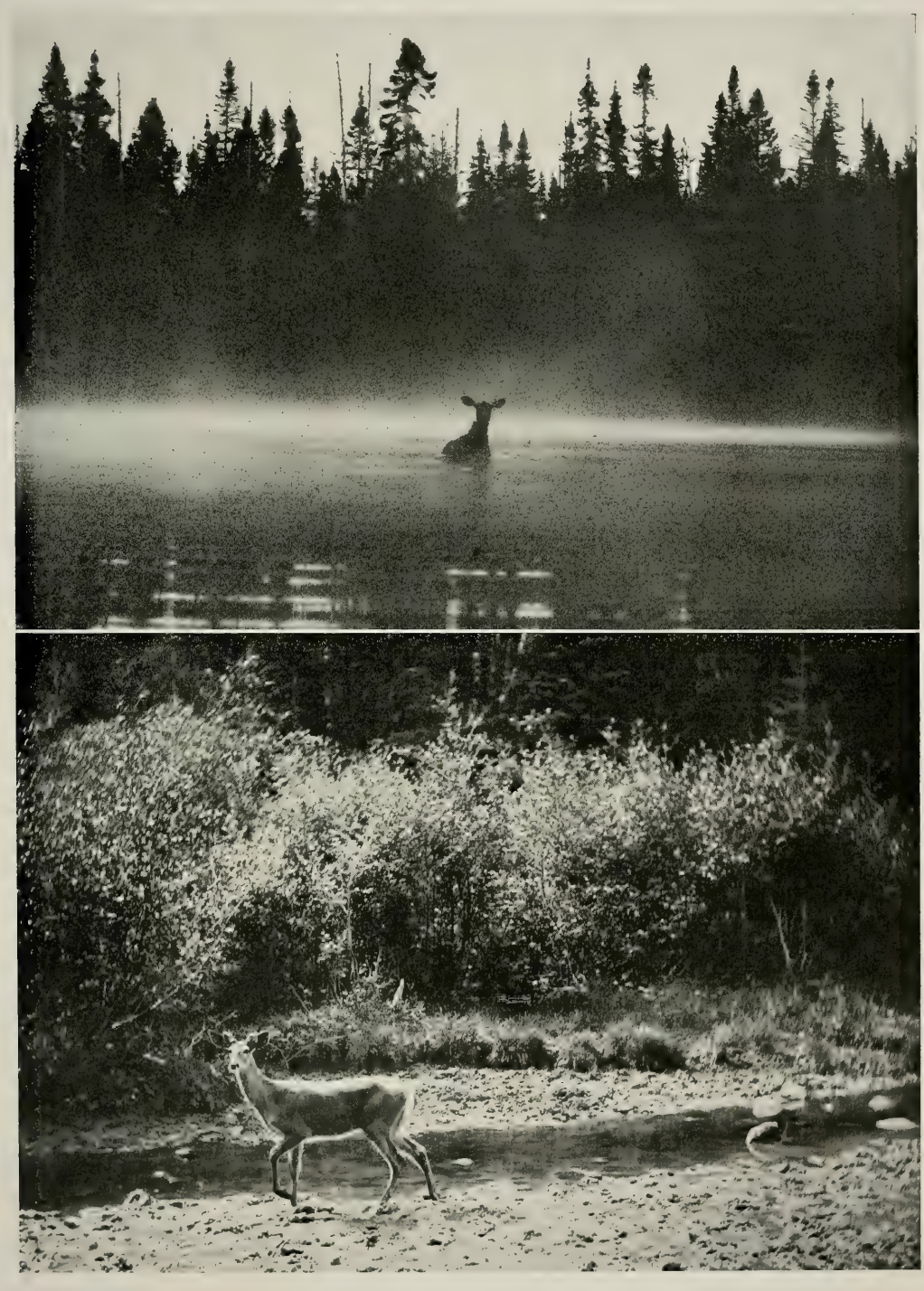
LARGE COW MOOSE DETECTING SCENT FROM CAMERA BLIND: RED BROOK CREEK, NEW BRUNSWICK

BULL MOOSE STRUGGLING ASHORE



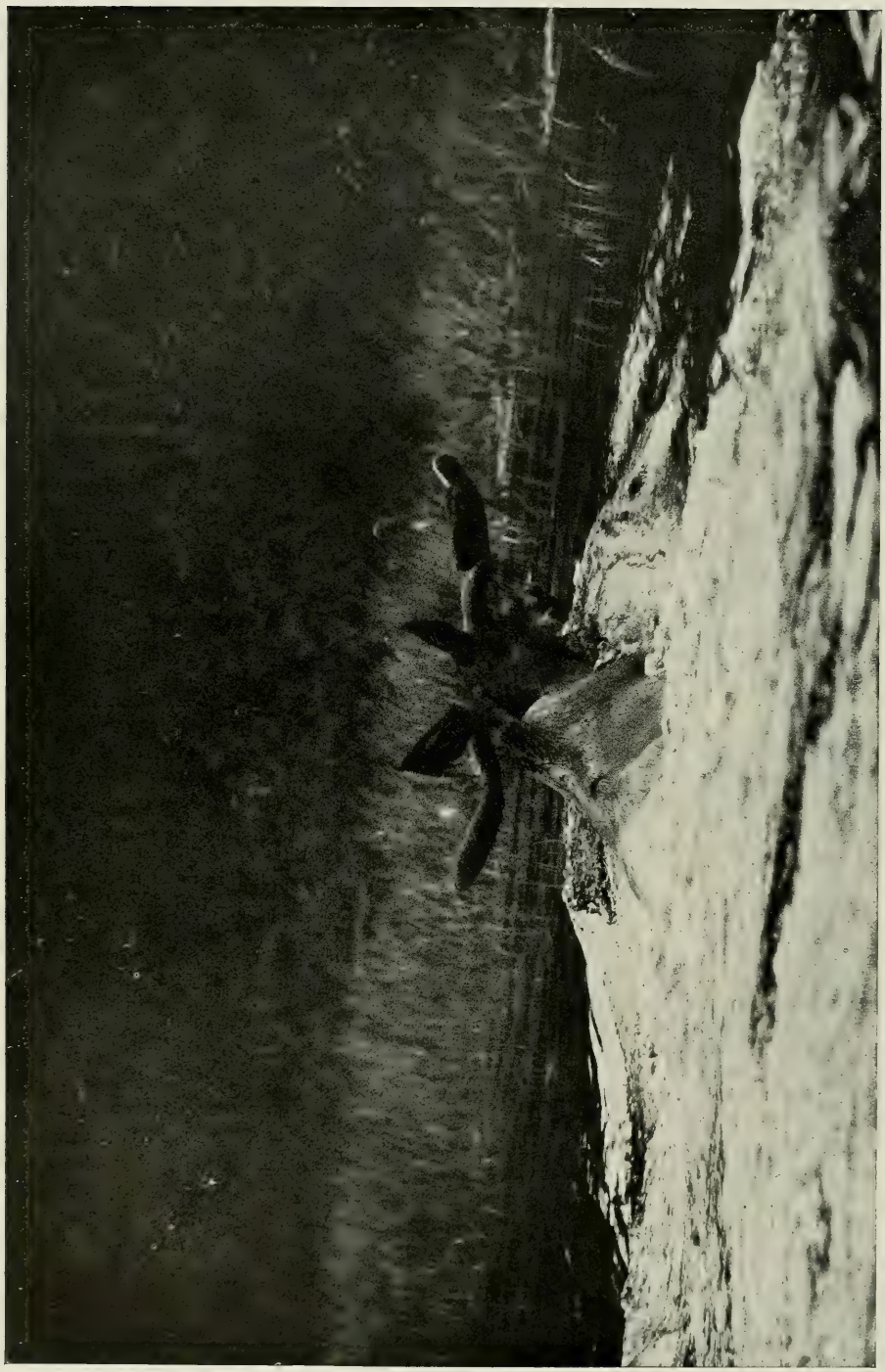
BULL MOOSE TAKEN IN JULY, 1907, AND AGAIN BY FLASHLIGHT THREE NIGHTS LATER

The fact that the same animal was photographed was not discovered until the development of the plates. Standing in 7 feet of water.

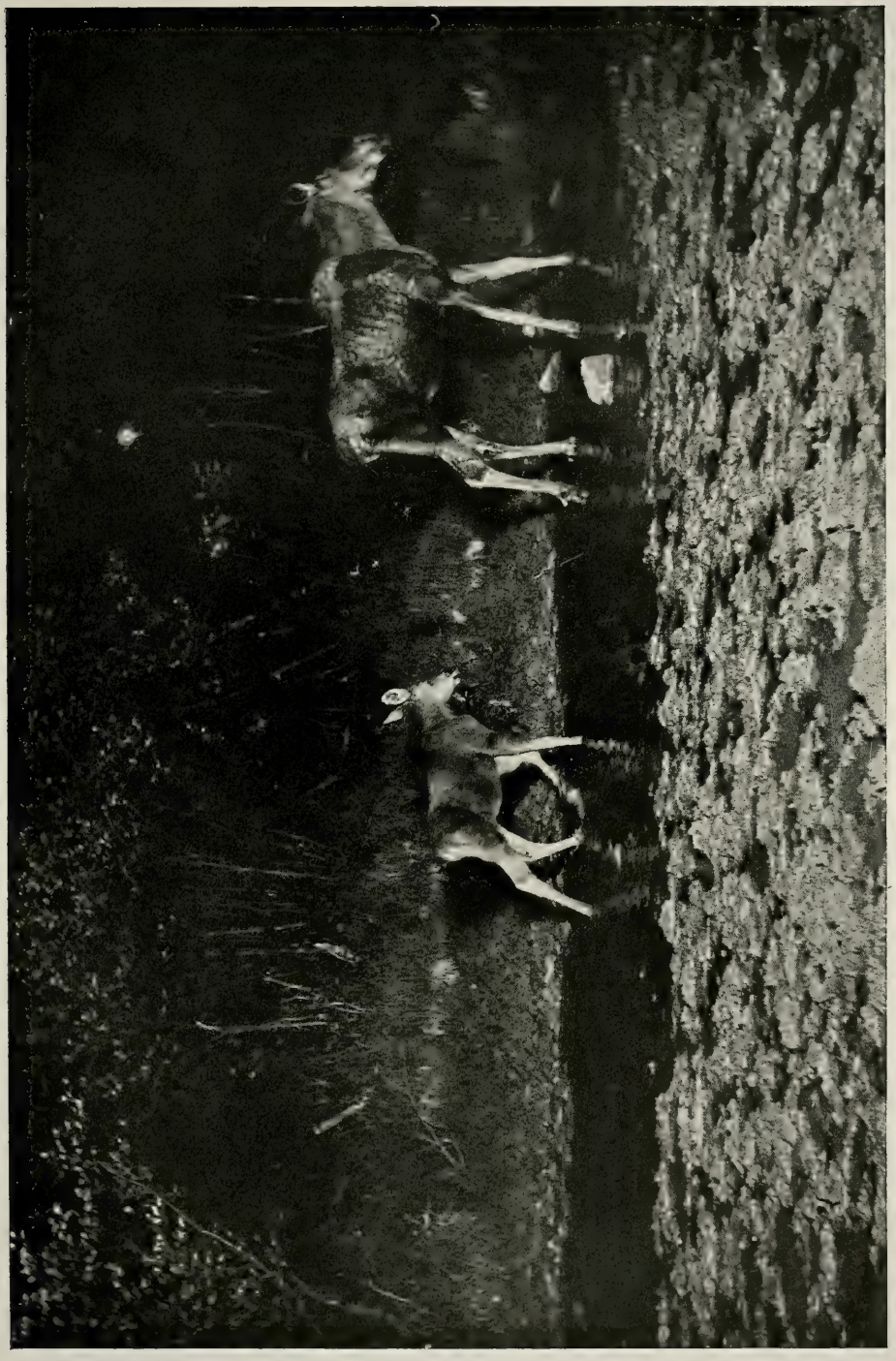


AN EARLY FOGGY MORNING ON NICTAU LAKE, 6 A. M.: COW MOOSE FEEDING

BUCK WHITE-TAIL DEER AT NEW BRUNSWICK TROUT STREAM



DAYLIGHT: BULL MOOSE SWIMMING SO RAPIDLY THAT IT REQUIRED THREE PADDLES TO OVERTAKE HIM (4 P. M.)
(SEE PAGE 428)



FLASHLIGHT: COW AND CALF MOOSE: UPPER TOBIQUE RIVER, NEW BRUNSWICK
Photographed from blind at midnight. Calf not seen until negative was developed two weeks later

DAYLIGHT: COW MOOSE PHOTOGRAPHED AT EIGHT FEET FROM BLIND

Drinking quarts of saline-sulphur water at a New Brunswick natural lick; dark afternoon; one-second exposure

the twenty-five feet, at which the cameras were focused.

Then a great flash, a heavy boom and all was silent for a moment as the smoke of the magnesium powder drifted away. By this time both paddles were in the water, and we were preparing for the worst. Yet there he stood, his jaws—now silent—the picture of what—anger or fear?

Before the question could be answered, down went the great head with a splash beneath the muddy surface. Was he going to turn himself into a submarine boat and spike us from below? No; he was simply engaged in pulling up another succulent lily root for his supper, satisfied that the little jacklight, behind which nothing could be seen, was but a trifling, insignificant thing, while the bright flash and the boom was a rather weak sort of a thunder storm.

Reloading the flash, reversing the plate holder, and waiting until the head

for the third time came to the surface, I fired a second flash, and then in a fit of carelessness talked too loudly, whereupon, with a rush the big animal pulled himself upon the bank, and was swallowed in the darkness of the summer night.

Year after year I had similar experiences, always to find that it was an exception not to obtain at least two photographs of the same moose at night; a thing that had never happened with the white-tail deer in nearly twenty years.

But in New Brunswick the real explanation came for this supposed belligerency of the moose at night. One evening, with Adam in the stern, his son in the middle, and myself behind the light, we paddled toward a large bull feeding in the center of the shallow lake (page 410). When thirty feet away, the head went out of sight, and we could have passed over the large antlers had we tried. When the flash went off he showed no concern, so holding our position I prepared and fired a second flash. But when for the third time I pulled the trigger the cap alone exploded with a sharp crack. In a mightly swirl the big animal, alarmed at the snapping sound behind the light, swam rapidly away to the inlet of the lake.

Recapping the flash, we paddled in the direction he had gone, and soon saw him facing the light and in about two feet of water close by the bushes (page 418). Again the flash was fired but, showing little concern, he began walking up the stream, while the paddlers continued to keep him in sight while I prepared for the fourth flash, aside from the one that missed. Just as he entered a broad pool—famous for trout—and with only his big antlers partly showing over the body, I let go the flash, for never before had I been given a chance to picture the retreating form of a moose at night.

In the fog of smoke before the jack I heard a great splash—then another—while a deluge of cold water drenched the cameras and myself, and there, standing within four feet of the jack—the big head towering seven feet above the canoe—stood the bull, looking not down into the light, but beyond as though preparing for another spring.

It certainly seemed time to do something, so, half rising, I waved my cap before his astonished eyes and gave a yell that could have been heard a mile or more. This was sufficient, for with an easy lope he entered the bushes upon our immediate left, and was seen no more. By this time Moore was howling with delight and making some remarks about the penetrating character of my voice, all of which I told him might be accounted for according to the end of the canoe one was in at the time. By an amusing coincidence this lively bombardment of a subject of King Edward's occurred on the night of July 4, and was in keeping with the pyrotechnic celebrations occurring the same evening throughout the states.

Yet this adventure explained it all and made finally clear what I had long suspected. The vivid flash was only seen by the moose on the bushes ahead, hence its sudden retreat; the cow that apparently charged our light in Canada, as the picture shows, was facing away from us; the bull that my old hunting companion shot at was standing, stern foremost, gazing at the diffused light of the jack on the bushes beyond, and the sudden rifle shot sent him away from the apparent source of danger in front and thus down upon the canoe. I then remembered that in five or six instances all the white-tail deer which had ever thrown water into the boat when dashing madly by us, in each and every case, were looking into the forest at the wavering light of the jack upon the trees or bushes, so when the explosion came they instinctively rushed into the water away from the terrifying shadows of the forest. On the other hand, in the hundreds of flashes fired directly into the faces of deer, moose, elk, and other wild animals, they never in a single instance charged forward after the flash was fired.

Hence avoid taking a flash or crack from the rifle at a moose when facing away from the jack, or otherwise prepare for a possible collision, more or less dan-

gerous when the great weight of the animal is considered, and if you can't swim, don't try it at all.

Another mistake equally common about the moose is its dangerous character in the fall, and in support of this hundreds of articles have been written, many of them by honest, well-meaning, sportsmen, usually of somewhat limited experience, describing their narrow escape from the sudden charges of these big animals when fired upon. The explanation is an easy one. When the moose is suddenly shot at from behind by an unseen hunter and unwounded, the animal almost invariably takes its back track, thus bringing it frequently face to face with the surprised hunter, who may or may not then succeed in shooting it down; and when a moose is fatally hurt, or very badly wounded by the shot from an unobserved hunter in front of the animal, it generally rushes madly forward twenty-five yards or more in the agony of its unexpected injury, and thus, once more, the animal is brought down upon the hunter with a suddenness that is somewhat terrifying to those who see in its glaring eyes an overpowering desire for revenge. In either case the animal has every appearance of charging the shooter, and hence the tales of the tenderfoot.

Then again there is a disposition among some to regard the bull moose as particularly dangerous in the mating season, even when not shot at. True, he is then more indifferent to his safety, but because in some remote forest his feverish eyes mistake the distant and skulking figure of a man for a lady-love or rival, and with a bellow he approaches, it is easy to understand how some persons purposely or ignorantly interpret such impetuosity as a desire on the part of the animal to give combat to his most feared and deadly enemy—man—when, as a matter of fact, just one faint whiff of the human body will send the biggest bull into headlong flight, his massive body quivering with fear.

INCREASE OF MOOSE IN NEW BRUNSWICK DUE TO WISE GAME LAWS

The moose of New Brunswick were extremely scarce prior to 1885, but with the gradual disappearance of the Indian trapper and hide hunter and the continuous migration of hundreds of these animals across the Maine border and the passage of effective game laws, this noble animal is now more widely distributed and is more abundant in New Brunswick than in any given area of equal size on the American continent.

No cows or calves can be legally killed, with the result that thousands of females now form great breeding herds capable of more than supplying the present destruction of the bull and adding many more each year to the permanent breeding stock.

With the restoration of the moose came the white-tail deer of Maine, and they likewise are most abundant, saving many a big moose or caribou that would otherwise be sacrificed to meet the temporary needs of the pot-hunter or trapper. The caribou are also plentiful, whereas in Maine there are now few or none.

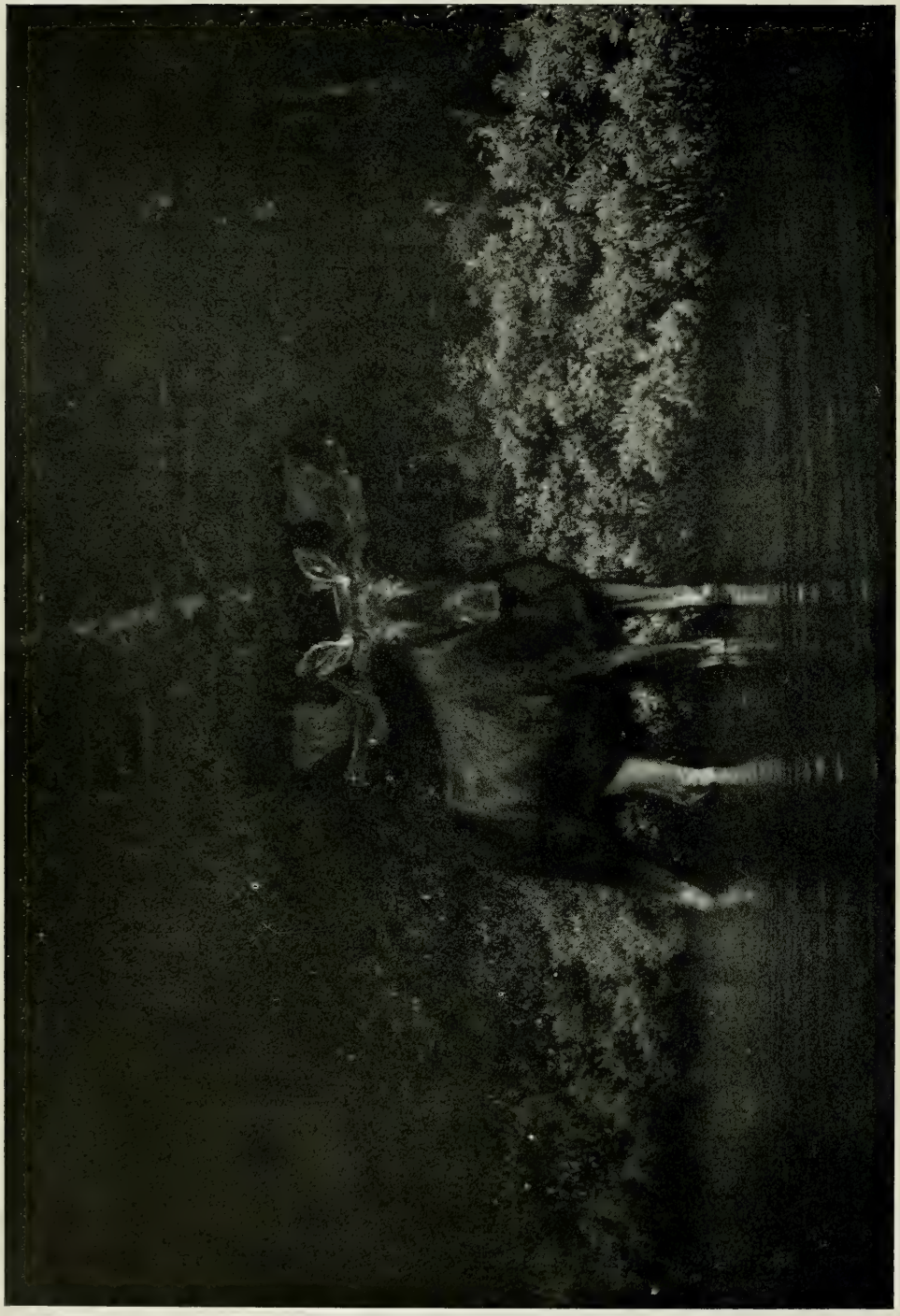
As an example of practical game protection, where the producing animals are carefully protected and the increment made the basis of a restricted killing, we find a splendid example of good judgment and concurrent rewards. Shall we, in this country, continue to ignore the rules of common sense, improvident for those of today and regardless of those to come?

A DIGRESSION ON SAVAGE BEASTS

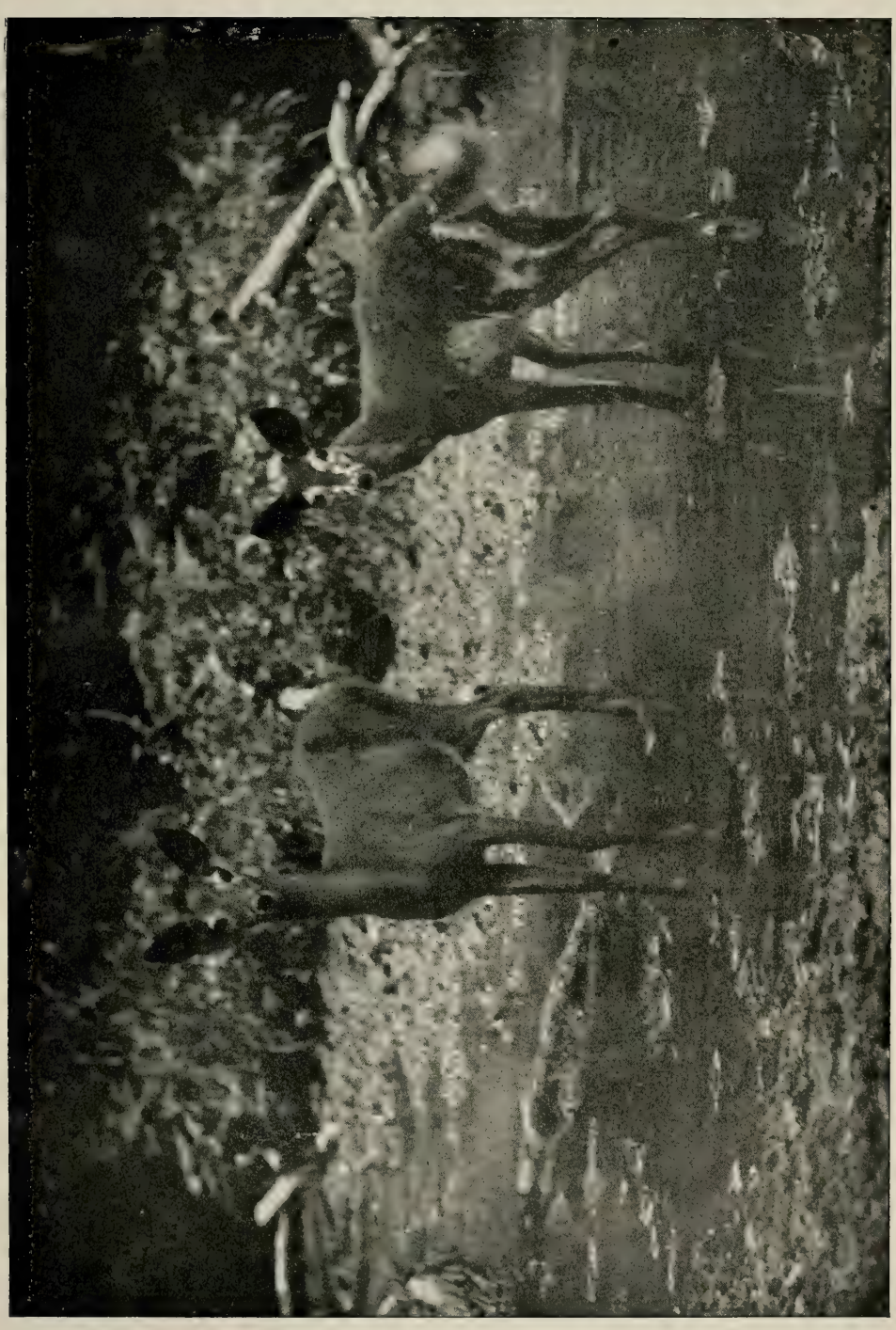
At this point I cannot avoid a digression. The almost daily reiterated reports of the "man chasing and devouring" wolf, the "fierce" lynx, the "savage" bear, the "terrible" cougar, the "revengeful" bull moose excite wonderment; for in my humble judgment all such blood-curdling attributes are unfounded and mendacious in nearly every particular. However great the perils of the African jungle, the situation in this country is entirely different. After a personal experience of more than thirty-five years in the American wilderness, from the Gulf of Mexico to the Hudson Bay waters, and especially throughout the range of these particular animals, and after an almost continuous investigation from

FLASHLIGHT: LARGE BULL MOOSE: UPPER TOBIQUE RIVER, NEW BRUNSWICK

Photographed from a blind at a distance of 15 feet (11 p. m.) July 9, 1907. The back of the moose slightly retouched



THIRD PICTURE OF THE BIG BULL MOOSE THAT WAS PHOTOGRAPHED FOUR TIMES IN TWENTY MINUTES AND WHICH, ON THE LAST FLASH, NEARLY BROUGHT DISASTER TO THE CANOE AND ITS OCCUPANTS: NICTAU LAKE, JULY 4, 10 P. M. (SEE PAGE 415)



PAIR OF YOUNG WHITE-TAIL DEER: TOBIQUE RIVER, NEW BRUNSWICK, JULY 8, 1907

Showing distinct traces of albinoism; one to right with a comical mask-like appearance. Taken in a heavy rain on a dark day

FLASHLIGHT: YOUNG BULL MOOSE GAZING WITH INTEREST AT APPROACHING JACK LIGHT: NICTAU LAKE, NEW BRUNSWICK, JULY 2, 1907

hundreds of experienced sources, I think it would be safe to say that there are more persons injured or killed through the attacks of domestic animals or wild animals in confinement, or partial confinement, in a single season than by all the wild animals of the forest in the past fifty years.

Tales of savage beasts largely emanate from two classes, the commercial nature faker and the novice, in which latter class may frequently be included land-lookers, surveyors, miners, the lumberjack, and the temporary homesteader, since many of these are wholly unacquainted with wild animal life and very often possess a vivid imagination, built up partly upon fear and partly upon a desire to report startling tales equal to the best that appear in the local press. True it is that the grizzly bear, badly wounded or defending its young, may occasionally show fight, but the old day when this powerful animal voluntarily stood its ground, is gone forever. At least in every district where the repeating rifle has taught the lesson of man's overpowering mastery, and today not a single experienced sportsman, naturalist, guide, or any reliable trapper will relate or underwrite any of these tales of perilous adventures with the wild and harassed animals of the American forests. The pestiferous mosquito and black fly may sometimes force the bravest hunter or trapper into a rapid retreat, but no man need ever hesitate to go voluntarily and unarmed into any so-called wilderness resorts of this country through a fear of menacing beasts. And in concluding this branch let it be said emphatically that the more dangerous the supposed traits of any particular animal, the more the certainty of its being the one now most fear-

FLASHLIGHT: BOAT RIGGED FOR NIGHT-HUNTING WITH CAMERAS, SHOWING FLASHLIGHT APPARATUS AND JACK LAMP: TAKEN 1893

ful of man's presence, whatever may be its attitude towards the other animals of the forest. To this fact alone does the predaceous quadruped now owe its existence, for were it to meet instead of retreat from the man with the gun the end would long ago have been reached.

And let it be said in justification of my apparent disposition to point out many prevailing misconceptions regarding wild animals that originally as a sportsman I believed in or accepted many of these popular fallacies. For it must be remembered that with the big-game sportsman few ever continue to kill moose, elk, caribou, or bear in large numbers or continue to hunt the same animals year after year, since usually they seek a few good trophies and revolt against the further killing of animals too huge for transportation or too tough for the platter; and hence those who hunt the same game season after season usually confine themselves to the smaller varieties of the deer family or to animals and birds whose flesh may be utilized.

Therefore most of the errors are due, in reality, to inexperience with certain habits of particular animals, however great the experience of the big-game hunter in the general field of sport.

The eye of the camera, the light of the jack, and of the penetrating flash, together with the same animal under close observation for hours at a time and year after year, have shown that in a single

season of camera hunting more accurate conclusions can be reached concerning our big game and their ways, in daylight or in darkness, than will ever occur through a dozen seasons where the crack of the rifle almost invariably follows the close proximity of the wild animal.

AT THE OLD CAMP ON LAKE SUPERIOR

While it was the purpose of the writer to describe in extenso several camera hunts on the Atlantic coast during the year, it would seem disloyal to entirely omit his old camp on White Fish Lake, in upper Michigan, where, as usual, a few weeks were spent last year and where, as might be expected, the camera was used from time to time. And at this point it seems proper to briefly describe some remarkable changes in the environment of the white-tail deer on Lake Superior and the dangers resulting therefrom, for it is of this animal, above all others, that the writer has made a life-long study.

The deer of upper Michigan have in recent years greatly changed their habits. Formerly in the early fall they gradually migrated south in order to escape the deep snows of the Lake Superior shores, averaging more than five feet on the level in mid-winter; but the building of several lines of railway across their old migrating trails, with the rights of way frequently barred by double barriers of wire fence, has cut off the retreat to their former winter range. Owing to the rapid destruction of timber on the hemlock ridges and the cedar swamps the winter quarters of the deer in the Lake Superior district have, each year, become more and more restricted, with the result that these animals seem doomed to quick destruction through the ravenous attacks of the cunning timber wolf. Compelled now, as the deer are, to yard in dozens and sometimes hundreds—with well-beaten trails throughout each range and snow deep and impenetrable on all sides—the wolf has an easy time in winter, for a single one may, in a few hours, destroy dozens of deer under such conditions. It has been estimated, from the carcasses found, that over 2,000 deer have been killed by wolves in the vicinity of White Fish Lake in the past four years, and possibly many more.

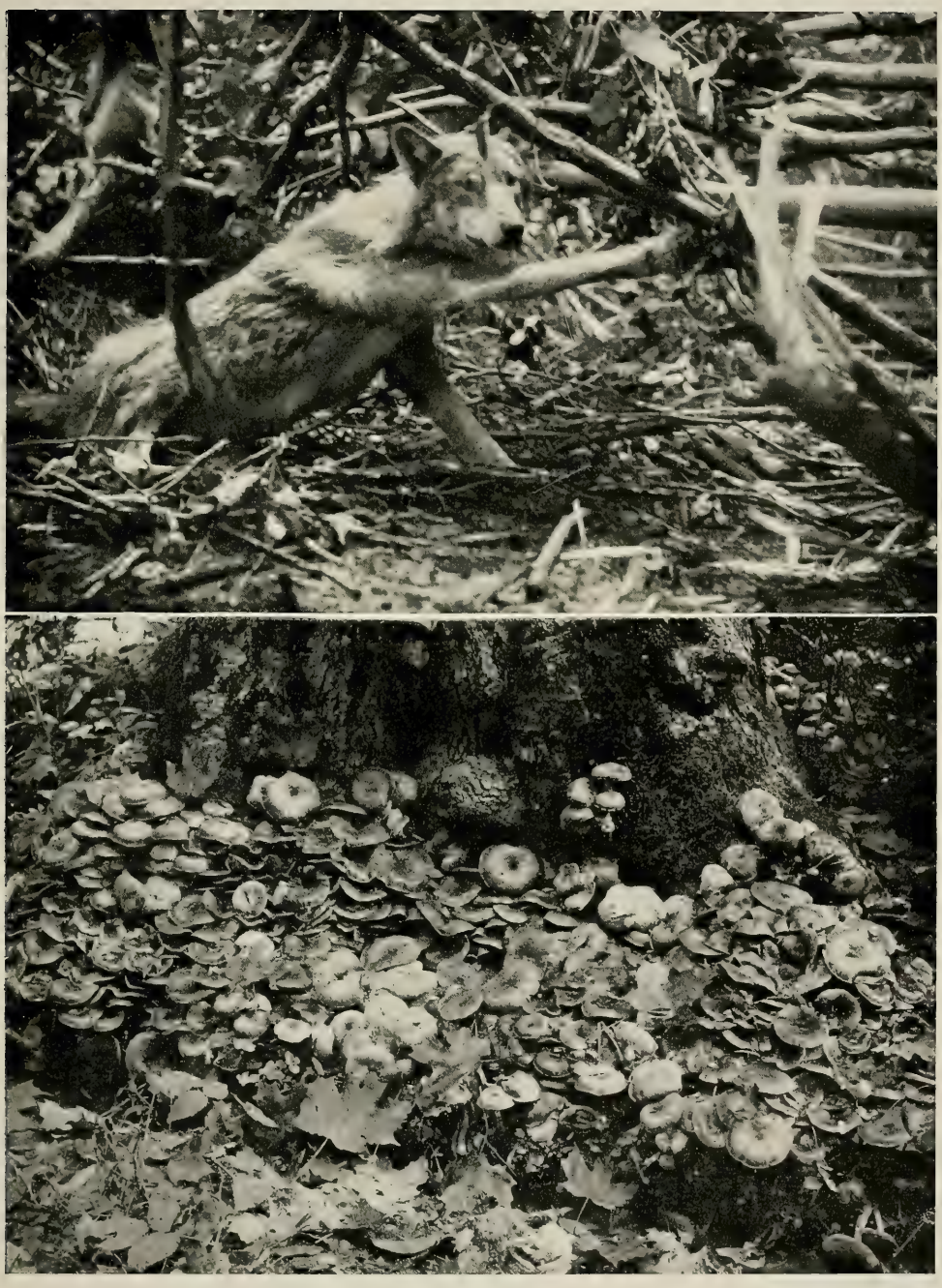
There is a picture, by flashlight, on page 426 of one of the few deer seen by me last season on White Fish Lake, where to see twenty-five in a single day, a few years ago, was not unusual.

Therefore it is with pleasure that I have also depicted on the opposite page the big gray timber wolf trapped on the same trail used by this particular deer and on the very next night. A mile away I heard its mournful howl, when the trap was sprung, and the next day the camera shot preceded the rifle bullet which wiped out its cruel and cunning life. Yet, in passing the death sentence, a feeling of momentary pity was felt, since, held in a cruel vise of steel, the big glowering animal was in no position to escape or defend itself. This was the nineteenth wolf trapped, poisoned, or shot in the vicinity of my camp the past thirty years, and in number represent the offspring of only three female wolves in a single season. The bounty in Michigan now varies from $35 to $50 per scalp, and every effort is being made to wipe out this the most resourceful, destructive, and elusive animal on the American continent. And to the Biological Bureau, at Washington, must be credited much of the successful work now being done, both in the deer forests of the North and upon the cattle plains of the West.

AFTER THE NEWFOUNDLAND CARIBOU

On a previous occasion I had spent many pleasant weeks in Newfoundland fishing, canoeing, and camping on the interior lakes and rivers, but it was not until the fall of last year that I made a special trip for caribou, and particularly for the purpose of picturing their water migration on several of the larger lakes, for when migrating they generally prefer the open waters to traveling across bogs and timbered land.

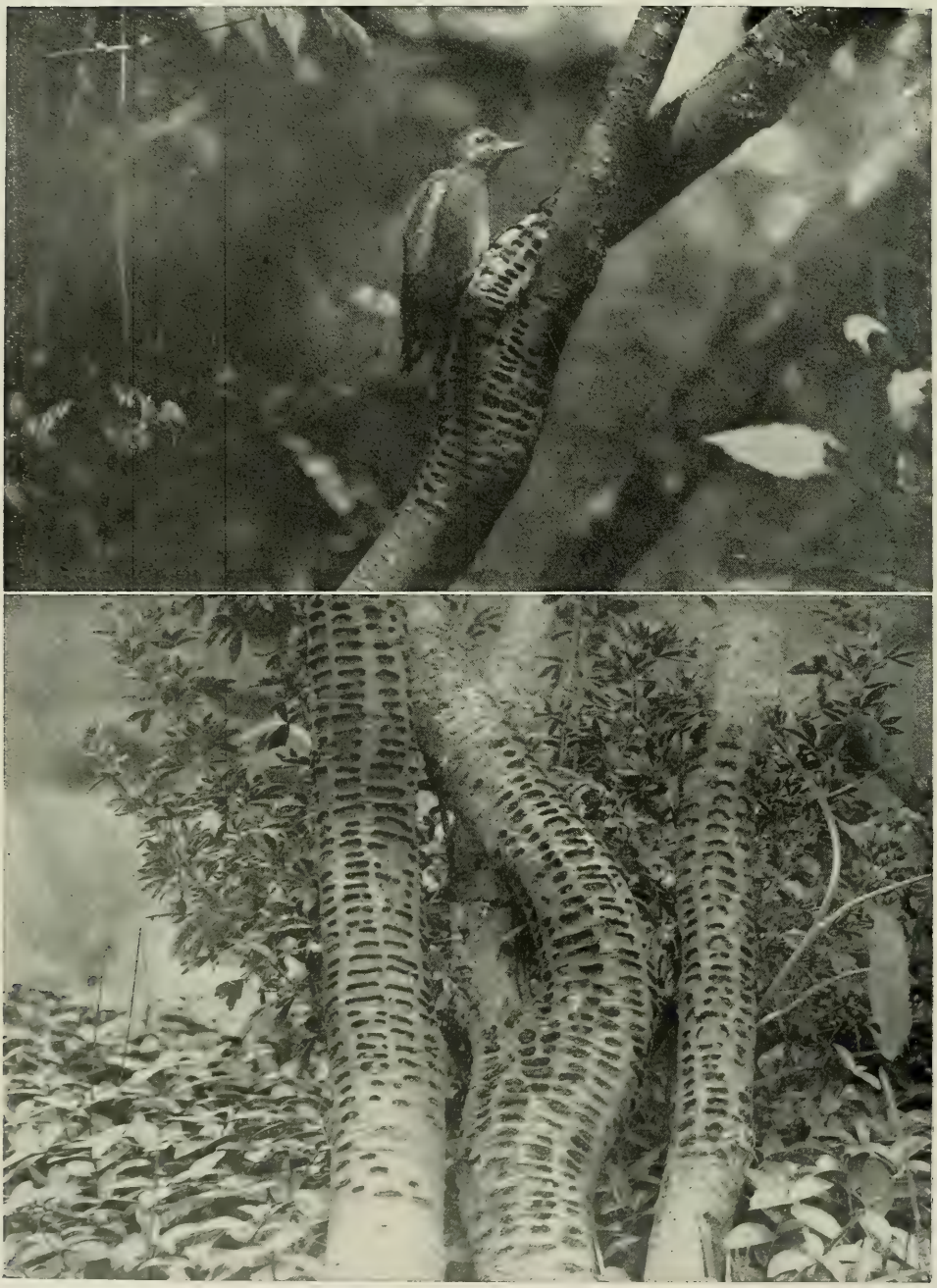
With my former guide, William Squires, we made a canoe trip up Sandy River to Deer and Sandy lakes—about



A 75-POUND TIMBER WOLF TRAPPED ON A DEER RUNWAY NEAR AUTHOR'S CAMP, LAKE SUPERIOR, JULY 29, 1907

An animal that now threatens with extinction the deer in Lake Superior region and Canada

500 FOREST MUSHROOMS AT THE BASE OF A HARD MAPLE, LAKE SUPERIOR



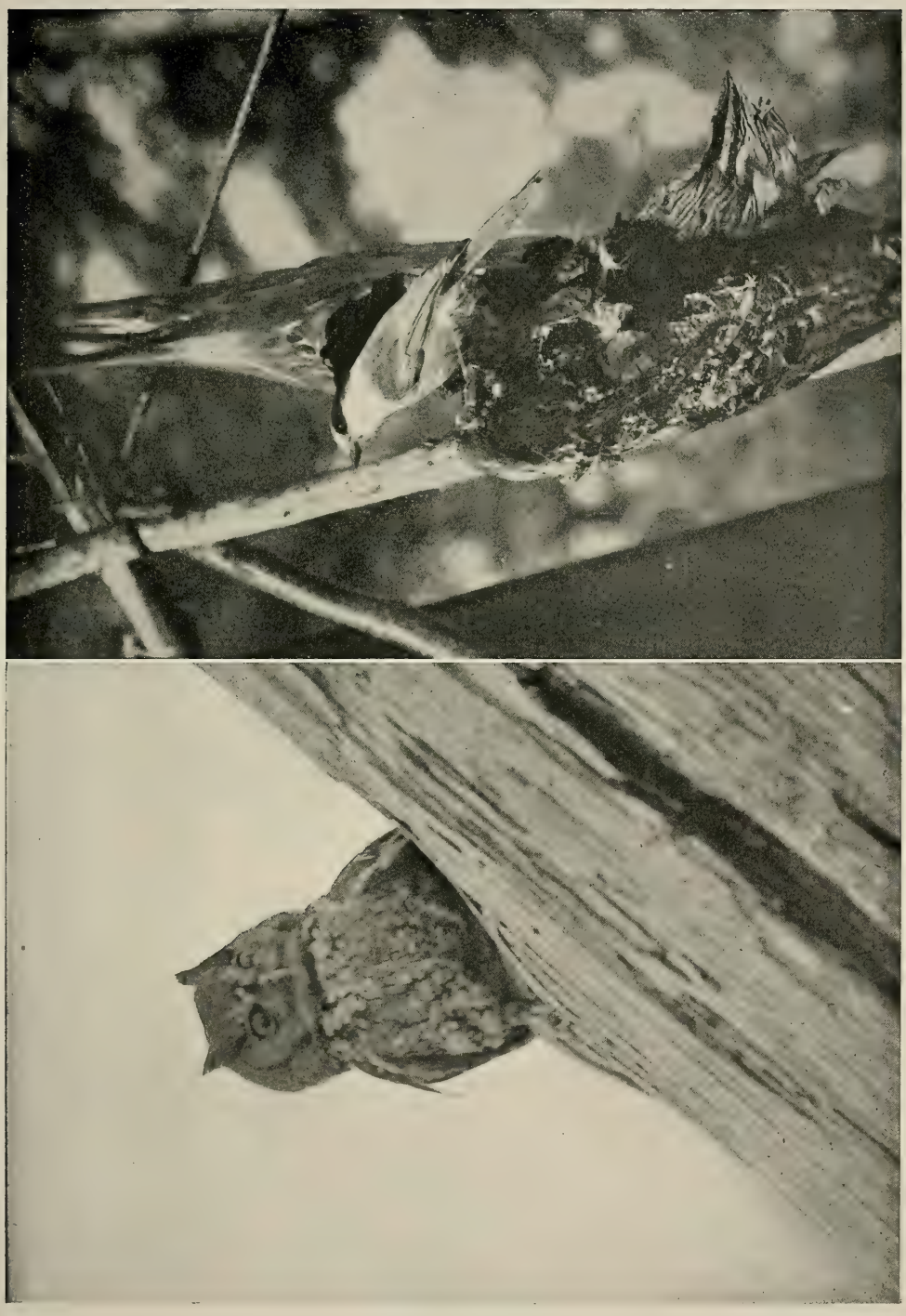
A SAPSUCKER MAKING FRESH SAP BASINS IN BARK, WHERE IT ALSO CATCHES FLIES ATTRACTED BY THE SWEET FLUID, JULY 26, 1907

ANOTHER VIEW, SHOWING REGULARITY OF SAP BASINS COVERING SIX WEEKS' USE

MINK TAKING ITS OWN PICTURE BY FLASHLIGHT BY PULLING ON STRING BAITED WITH FISH: WHITE FISH RIVER, MICHIGAN, JULY, 1907

FLASHLIGHT: WHITE-TAIL DEER, WITH PORCUPINE TO RIGHT, JULY 28, 1907, WHITE FISH LAKE, MICHIGAN
(SEE PAGE 422)

This graceful and cunning animal is more widely distributed in the United States than any other member of the deer family; due to its wonderful resourcefulness and the dense coverts it usually inhabits



TWO EXTREMES: A FLORIDA OWL AND A CANADA JAY OR WHISKEY JACK, NEWFOUNDLAND

The latter is often called the "meat bird" and is pictured on a haunch of caribou

DEERLAKE, SANDY RIVER DISTRICT, NEWFOUNDLAND

Where the water migration of the caribou was studied. Note camera in bow of canoe

half the distance north of Grand Lake that we had gone the year before. Our camp was located at the outlet of the lake, which, with the adjoining one, formed an east-west base line of more than nine miles across the southerly line of migration. Here, on the second day, a fine stag with an antlered doe and fawn quickly entered the water, and looking neither to the right nor the left, began their long swim across the lake.

In a few minutes the canoe was by their sides, when, raising their heads aloft—previously held close to the water—they made a gallant effort to outstrip us, their stubby white tails held aloft like peaceful flags of truce. Yet why describe what the camera saw each day, when here are the scenes themselves.

I was surprised to note the small number of fawns, based upon close personal observations and those of several others. In more than 300 does of which I have a record last fall there was on an average but one fawn to four does—in striking contrast to the moose and the deer, who, besides usually having two young each, are more or less harassed by the timber wolf and cougar, while in Newfoundland man is the sole enemy of the caribou, for the wolves, once numerous, have about become extinct.

And this proportion held true under a great variety of circumstances; for with single does three were barren out of every four, and in a group of four there would be but one fawn or none, and in one band of sixteen does, crossing the river in single file, I counted but four fawns, and in larger herds the young were equally scarce. While this may be due to the extremely damp and rigorous weather in the spring, at the time the fawns are born, or to the peculiar habit of single stags in rounding up great herds of does each fall, the fact seems to be that the young of each year are away below the average of those of the other antlered game in this country.

And if my conclusions are right, it only points out the great necessity for proper game laws on this island; for once these great herds of caribou are greatly reduced in numbers the process of restoration will be extremely slow.

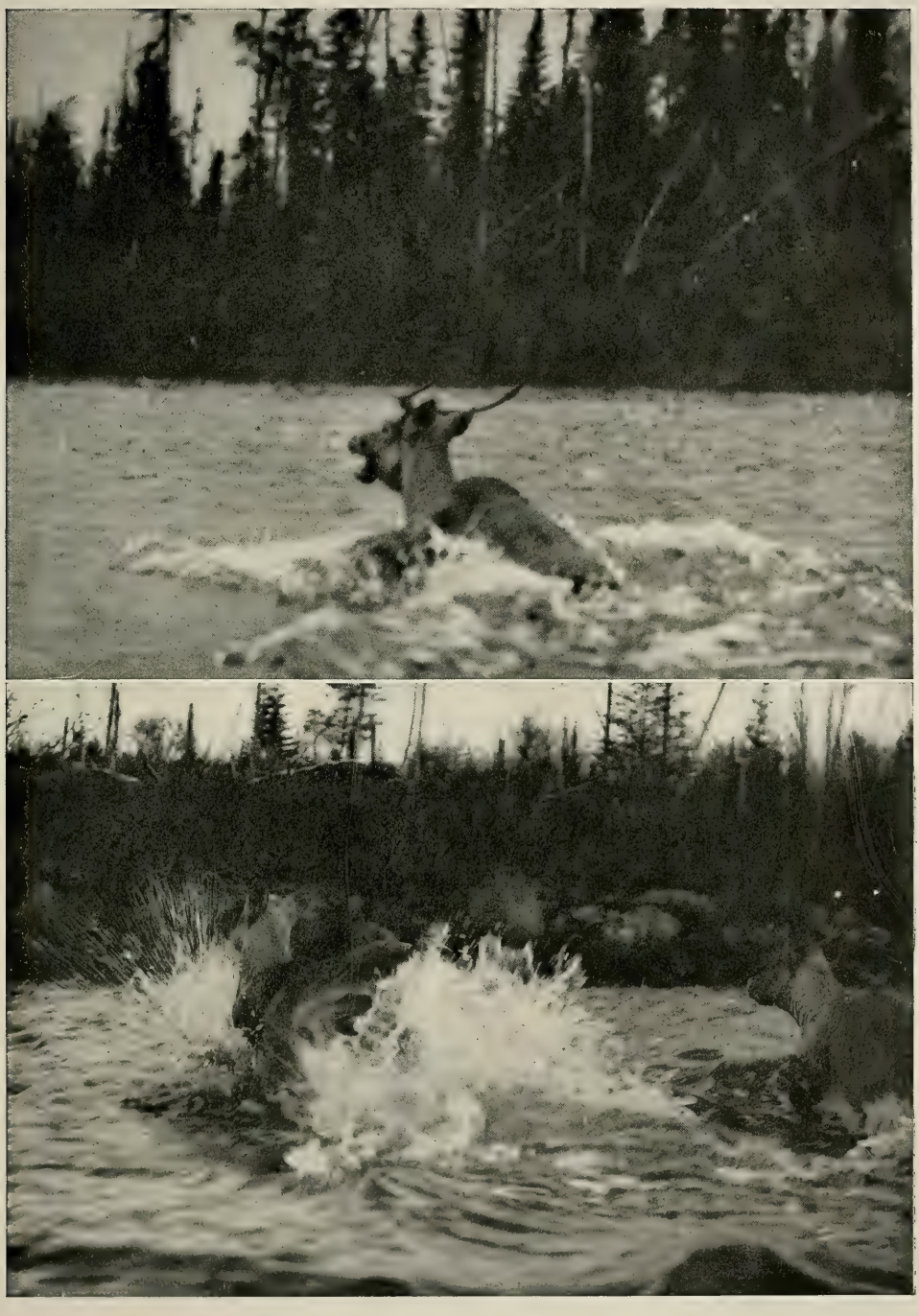
There is another matter that I may express an opinion upon, though it differs

TESTING CAMERA WITH THREAD SET ACROSS CARIBOU TRAIL

DOE AND FAWN THAT TOOK THEIR OWN PICTURES SEVERAL HOURS LATER: NEWFOUNDLAND, OCTOBER 20, 1907

DAYLIGHT: WEASEL: NEWFOUNDLAND: ITS NIMBLENESS MAKES IT HARD TO PHOTOGRAPH

CARIBOU STAG, DOE, AND FAWN: ONE-HALF OF THE DOES CARRY SMALL HORNS. THE FAWN IS ASSISTED BY THE SUCTION IN SWIMMING



CARIBOU IN AGONIZED RUSH TO ESCAPE CANOE

CARIBOU SWIM SLOWLY, BUT GO ASHORE WITH GREAT SPEED

CARIBOU IN HERDS SWIM COMPACTLY: SUCTION HELPS THOSE IN REAR. FOUR DOES AND A SINGLE FAWN

(SEE PAGE 428)

VERY LARGE CARIBOU STAG, TAKEN IN ROUGH WATER AND ON A DARK DAY

CARIBOU STAG WITH SYMMETRICAL HORNS PHOTOGRAPHED AT EIGHT FEET. NOTE BEAUTIFUL WHITE COLLAR CARRIED BY STAGS ONLY

from the statements of Mr Selous and other well-known sportsmen who have hunted on this island, viz., the supposedly great speed of the caribou in swimming. When undisturbed, a single caribou, crossing large lakes, swims about three miles an hour, and a fair-sized herd swims somewhat slower. When first sighting the canoe, the animal springs half out of the water, and then, with head erect, tries to elude the paddlers, and for the first one hundred yards its speed varies between five and six miles an hour; and then, becoming somewhat exhausted by the extreme exertion, the speed slows down to about three and one-half miles an hour—a gait that one paddler in a loaded canoe has no trouble in beating. The swimming speed of this animal is therefore below that of the moose and the white-tail deer.

I saw no caribou enter the water before 7 a. m. or later than 5 p. m., the movement being greatest from 10 to 3. The animals, as a rule, are not nocturnal, either when migrating or feeding, though in the fly season they feed at night, and late in the fall, under the stress of heavy snow-storms, sometimes travel night and day.

It is also noticeable that they generally move against the wind, depending almost wholly upon the nose to detect danger, which from time immemorial always lay before them, in their long march from the northern peninsula to the southerly coast. As the result of relying so much upon scent, neither their hearing nor sense of sight is at all acute, for one may sit close to the runway and the animal, if the wind is favorable, will pass by within a rod.

Since the building of the railroad that intersects the island, many large herds of caribou remain permanently either north or south of the track, and in this respect resemble the white-tail deer of northern Michigan before mentioned.

While the island is visited each fall by numerous non-resident sportsmen in quest of stags with fine heads, it is difficult to compute the amount of meat abandoned each year in the more remote portions or because the rankness of the stag often makes its meat unfit for food at that season of the year. Two years ago, for instance, I met three young collegians from the "States," who several days before, on barrens east of Grand Lake, encountered a number of migrating caribou, and by good judgment and accurate shooting had, in a single day, picked out and killed nine large caribou stags—the three apiece allowed by law. They candidly admitted that, owing to the toughness of the stags and the distance from their camp, every ounce, aside from the heads, had been abandoned, representing a total of more than 3,500 pounds.

Yet these young men had come thousands of miles for caribou hunting and were in every (other) respect a manly set of fellows. After seeing some of my caribou pictures and hearing the incidents connected therewith, they seemed to realize that big-game hunting with the camera was an ideal method and one that they hoped to try hereafter. As with the caribou stags, so with the bull moose, the bull elk, and the gigantic grizzly bear, whose decaying flesh we have noticed year after year polluting the air of some beautiful valley, simply because the antlers or the hide was all that could be saved when these great animals were stricken down in districts too remote for transportation.

THE BROWN PELICANS OF THE INDIAN RIVER

For many years I had been familiar with the pelican colony on Indian River, Florida. On one occasion, four or five years ago, I made a trip expressly to take flashlight pictures of the breeding birds, but upon firing the first flash the whole colony took wing, heading for the boat with its glaring lantern, until we were fairly overwhelmed, as hundreds of great birds, with flapping wings and large bodies, banged into or over the boat. Crouching down in the bottom, with the cameras hurled from the bow, we waited until the avalanche was over, when my Virginia guide, a stranger to

RISING FLIGHT OF PELICANS: *a.* WINGS SEEN AT DIFFERENT ANGLES. *b.* WHERE IT RESEMBLES THE CANADA GOOSE

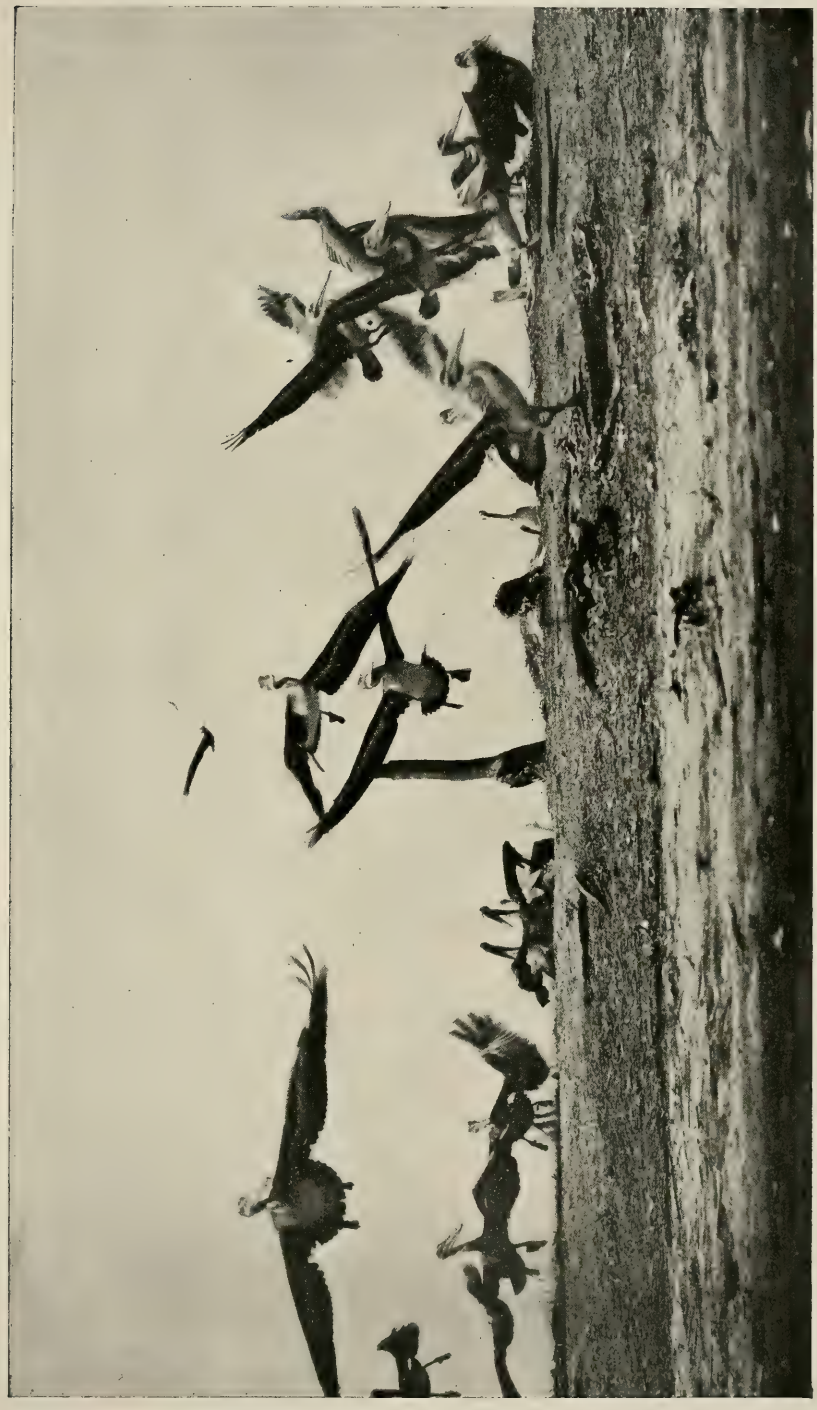
SIDE FLIGHT OF PELICANS

these waters, remarked as he tossed a flapping bird overboard, "Darn these pell-mellicans." Through fear of disturbing the birds further in the midst of the nesting season, we quietly withdrew with a single much-prized picture to our credit.

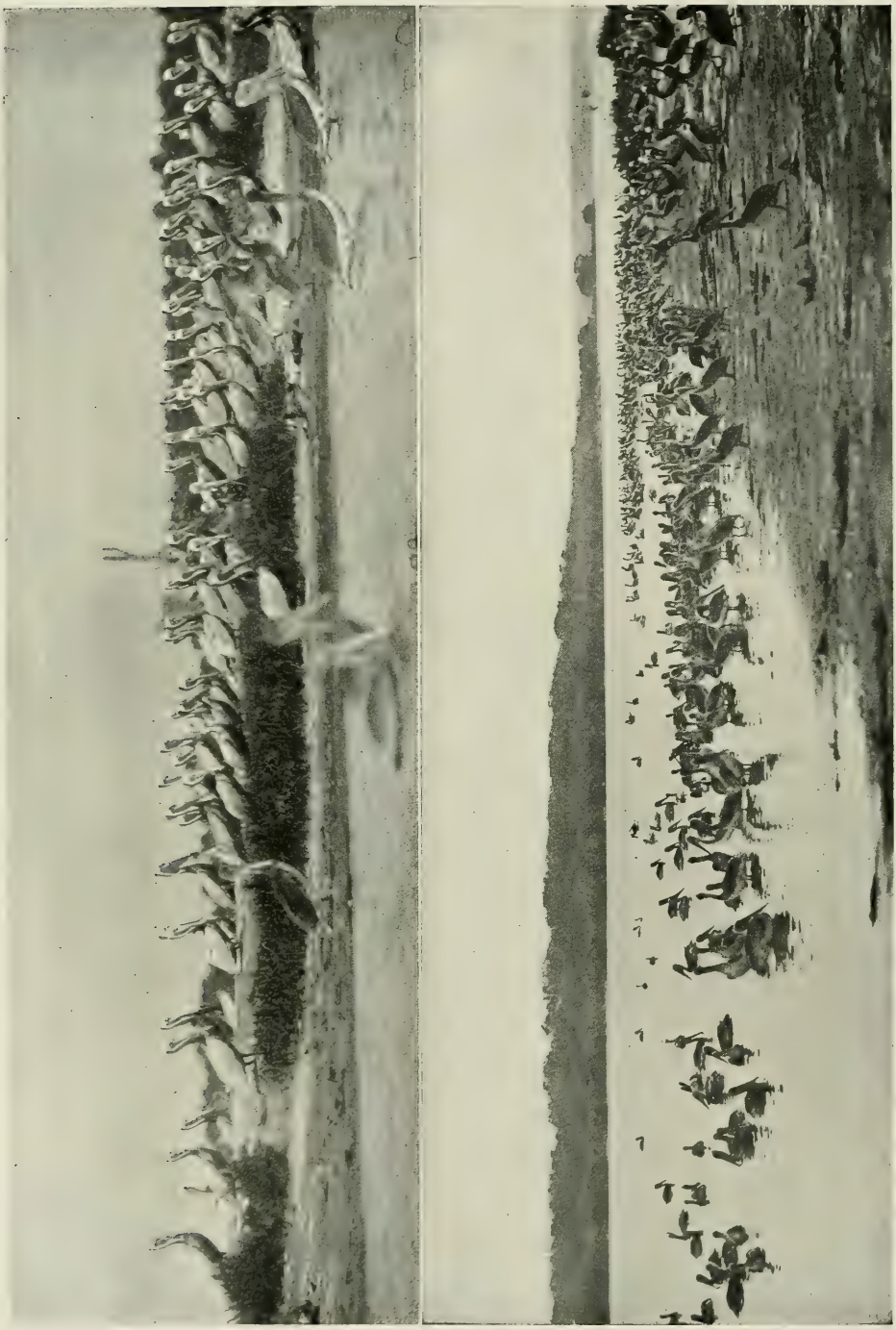
This spring, in company with my former shipmate, Mr Chapman, we revisited the island, he to take cinematograph pictures of this wonderful colony and some upon the new colored plates, and I to get pictures of these birds in flight or with the stereoscopic camera.

We found on March 10 most of the young birds ready for flight, numbering some 1,500, while scattered about were the remains of fully 800 more of a later hatching, killed either by the heavy freeze of the week before or by reason of a midnight raid made by local fishermen, who, disregarding the fact that the pelicans live almost wholly upon the worthless menhaden taken in the open sea, have shown in recent years a great enmity toward these birds because the young occasionally, in their early efforts, catch a few mullet in the Indian River.

The brown pelicans are abundant on the Florida and Gulf coasts. When going or return-

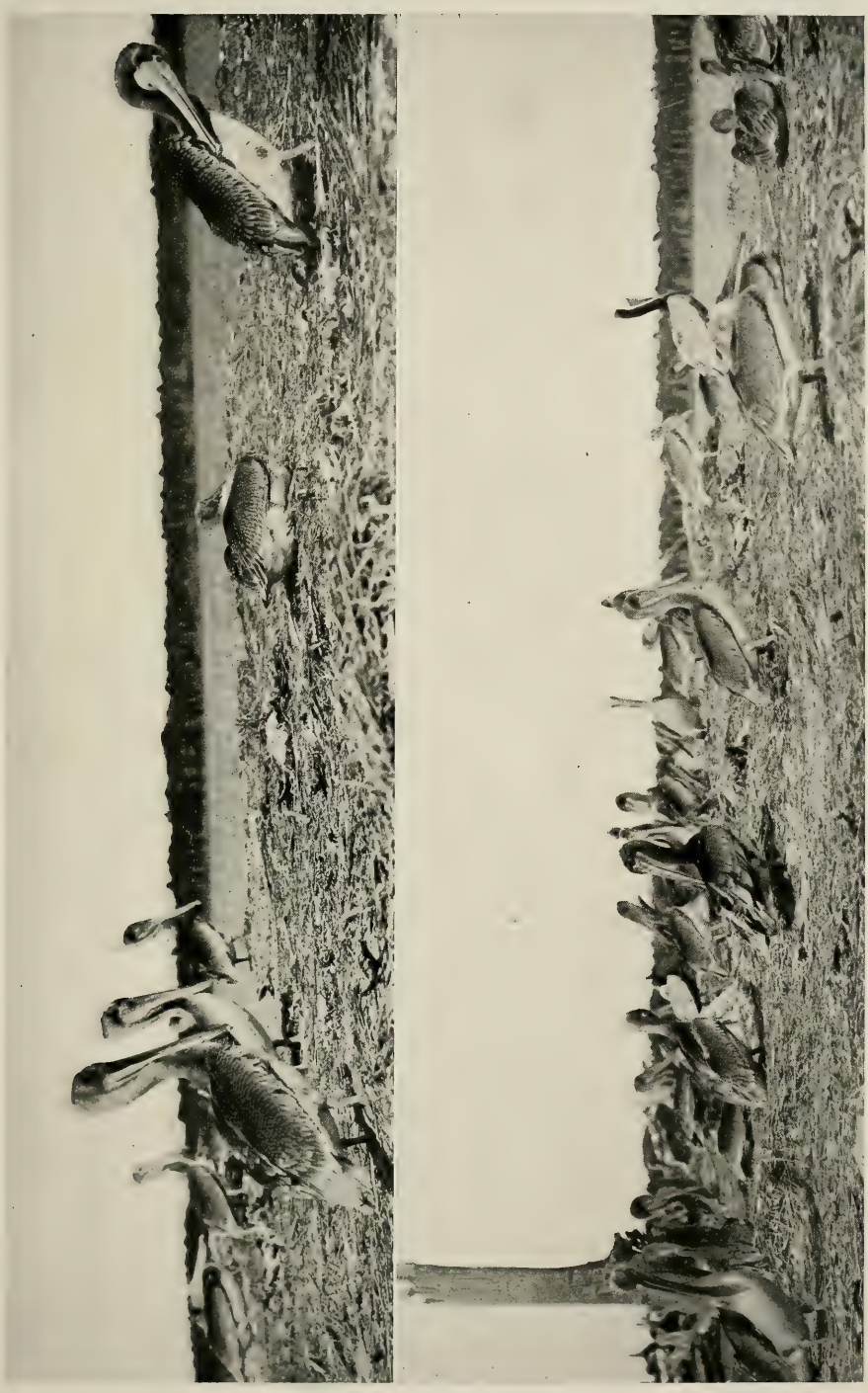


APPROACHING FLIGHT OF PELICANS



A GROUP OF FINE OLD PELICANS, WITH A FEW YOUNG IN FOREGROUND, ALL FACING ONE WAY

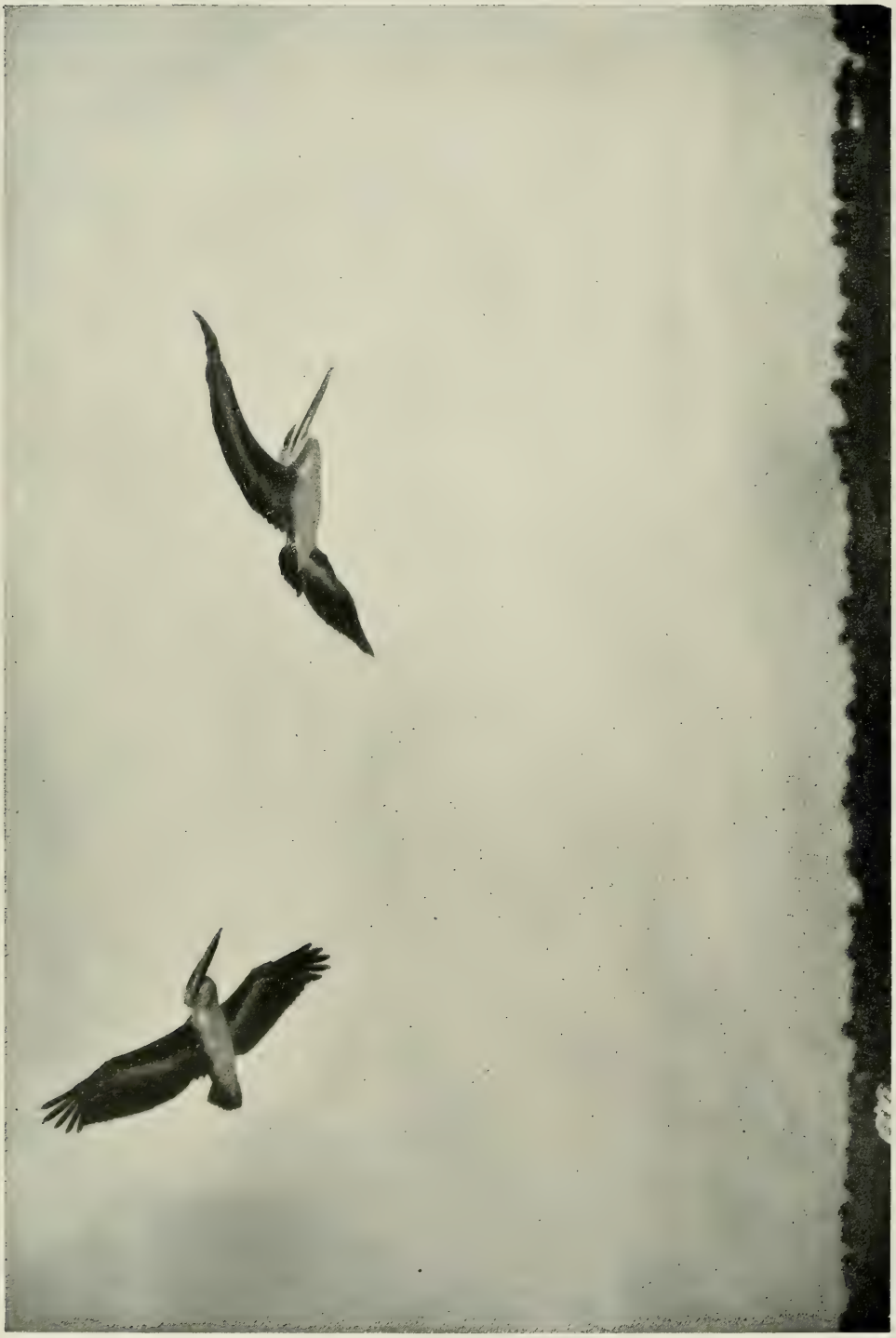
ABOUT 1,000 YOUNG PELICANS BATHING AND PLAYING AT WATER'S EDGE



GROUPS OF YOUNG PELICANS SLEEPING AND PREENING THEMSELVES

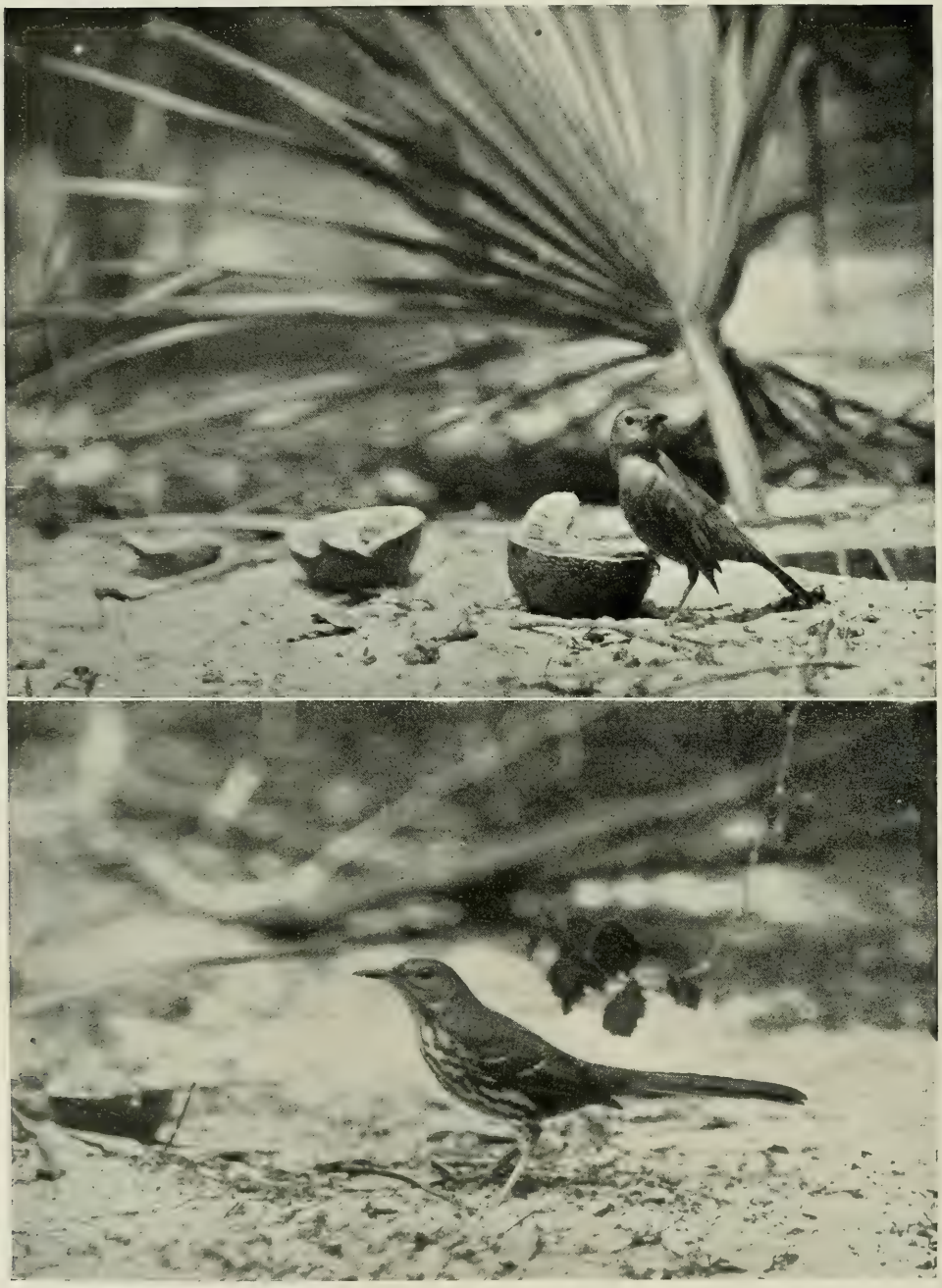
YOUNG PELICAN IN "GOOSE-FLESH" PHASE

PELICANS IN SHADOW OF APPROACHING THUNDERSTORM



PELICANS COMING FROM THE OCEAN TO INDIAN RIVER WITH FISH FOR YOUNG

MALE AND FEMALE QUAIL IN ORANGE GROVE: HALIFAX RIVER, FLORIDA, APRIL 1, 1908 (SEE PAGE 446)



CATBIRD EATING ORANGE: HALIFAX RIVER, FLORIDA, APRIL 1, 1908

BROWN THRASHER APPROACHING ORANGE (SEE PAGE 446)

WILD GRAY SQUIRRELS EATING ORANGES, HALIFAX RIVER, FLORIDA, APRIL 1, 1908

ing from the fishing grounds they usually fly in flocks of from four to ten, in single file, the leader setting the pace and the rest in slow measured strokes flop or sail in unison. The adult, in the breeding season, has a seal-brown head and neck with a yellowish crown, the remainder of the body being silver gray; the young, when half grown, are a soft, snow white, changing to a dull gray brown for the first year.

Late in October and on the same day the pelicans of Indian River suddenly assemble from all directions as though controlled by instinct or concerted signals, and a few weeks later are housekeeping on a small island occupied exclusively by pelicans for at least seventy-five years.

Recently all the mangrove bushes have been broken down or destroyed by the heavy nests, with the result that the pelican, from a tree-nesting bird, now occupies the ground, even though many similar adjoining islands are well wooded.

The breeding season is very prolonged, lasting until nearly June, with marked evidence of breeding in detachments, due partly to the small area of the island, the loss of young by high tides or frosts, and perhaps also to the fact that many of these birds raise more than one brood each season.

The young are usually three in number and therefore, unlike the man-o'-war birds and the boobies, are sufficiently abundant to withstand the ordinary persecution by man, destruction by disease, or the elements. The full-grown young are cannibalistic, swallowing down the newly hatched with evident relish whenever the parent birds of the latter are away for more than a moment or two.

Under the wise protection of the National Audubon Society and through the foresight of President Roosevelt in setting aside this island as a government reservation for breeding birds, there should be little difficulty in preserving the pelican of Florida from extinction, where now they may be seen daily along four hundred miles of coast, partly filling the gap made by the almost complete destruction of the egret, the white heron, the flamingo, and the roseate spoonbill, the former victims of a woman's fashion.

SMALL GAME IN A FLORIDA ORANGE GROVE

We have now nearly reached the bottom of last season's game-bag, and in it will be found specimens of bird and animal life more common to the suburbs or the less remote portions of our country. To many of the present readers big-game hunting is beyond their anticipation, and therefore the opportunity to picture at their country homes many local birds and animals is worth reciting, however much the writer's inclination lies in seeking game of rarer kind.

After leaving the pelicans of Indian River a visit was made to relatives on the Halifax River, one hundred miles farther north, where a big orange grove extended back to heavy timber and many thickets. No rain having fallen for three months, the birds and forest animals were alert for any new sources of water supply. Taking advantage of this, I sank a small wooden pail level with the soil, filled it with water, and by it scattered bread crumbs, grain, and oranges cut in twain, while twenty feet away my little green canvas tent was erected, partly sheltered with palmettoes.

In a short while many visitors came, and as the tent was moved closer each day, they feared it not. On the third day I entered the blind for the first time, using my largest lens (14-inch focus).

In the total of four hours spent in the tent on different days, I succeeded in getting photographs of the cardinal (male and female), mocking-bird, cheewink (male and female), turtle-dove, sand-dove, brown thrasher, field sparrows, quail (male and female), squirrels, rabbits, and wood-rats, several of which are here shown approaching or nibbling at the oranges, which above all else were their favorite food and drink. A pair of quail excited my greatest interest, as their appearance was totally unexpected, though I had been hearing their soft spring notes near by for several days.

And here ends, for the present at least, the tale of a camera's conquest in the realms of the woods and the waters.

PEARY'S POLAR EXPEDITION

THE substantial and exceedingly generous subscription of $10,000 by Mr Zenas Crane, of Dalton, Massachusetts, to the Peary Polar Expedition will probably enable Commander Peary to go north again in July, 1908. The *Roosevelt* has been refitted with new boilers and machinery and stocked with sufficient provisions for three years' absence. Provided $15,000 additional is subscribed, and we are informed by Commander Peary that he has good hope of obtaining this amount, the expedition will leave New York early in July. Commander Peary will take a second ship as far as Smith Sound to carry extra supplies and coal for the *Roosevelt*. After embarking his Esquimo at Etah, Greenland, he plans to force the *Roosevelt* as far north as the ship attained on his last expedition, and then to winter on the north coast of Grant Land, making his polar dash in the spring of 1909.

If Commander Peary can establish his winter's base for the coming expedition as far north as he had it last time, we have strong reasons for believing that he will succeed in reaching the Pole on the next attempt. His last dash across the ice was unsuccessful largely owing to the rapid current discovered by him setting eastward across the northernmost coast. This current, however, he intends shall help his advance on the present expedition, as he will march in a northwesterly direction instead of aiming straight for the Pole when he leaves land. The current would then carry him toward the Pole instead of away from it. Readers of this Magazine are referred to the special map of the North Polar regions and the Arctic number, July, 1907, which shows the route planned by Commander Peary for the present expedition.

It would be most unfortunate if sufficient funds were not forthcoming to enable Commander Peary to go north once more. He is in the prime of life and has more than twenty years of successful Arctic experience behind him. Mr Zenas Crane merits the cordial approval of all Americans who want to see this great geographical problem solved soon and by an American.

MAGNETIC SURVEY OF THE PACIFIC

WITH the return of the yacht *Galilee* to San Francisco on May 21, after an absence of nearly three years, a most successful expedition is brought to a close. This yacht was chartered by the Department of Research in Terrestrial Magnetism of the Carnegie Institution of Washington in order to make a magnetic survey of the Pacific Ocean, both in the interest of safe navigation of these waters and of magnetic science in general. For a fuller statement of the objects of the work and of the results of practical and scientific importance obtained, the reader is referred to the article by the Director of the Department of Terrestrial Magnetism, Dr L. A. Bauer, on "The Work in the Pacific Ocean of the Magnetic Survey Yacht *Galilee*," in this Magazine, September, 1907.

For the greater part of her lengthy cruise the *Galilee* was commanded by Mr W. J. Peters, the scientific representative of the National Geographic Society on the Ziegler Polar Expedition. He has been assisted by the following observers, assigned to him at various times: Messrs J. P. Ault, D. C. Sowers, J. C. Pearson, P. H. Dike, Dr Martyn, and Dr George Peterson. Captain J. T. Hayes, a skillful sailing master, had charge of the navigation of the vessel throughout the cruises. Dr Bauer in his various reports accords the highest praise to Mr Peters and his assistants for the very satisfactory and expeditious manner in which the magnetic work was performed.

The total length of the cruises executed in the Pacific Ocean during the period of not quite three years aggregates 65,000 miles, or equivalent to a circumnavigation of the globe two and a half times. The cruises extended from the Pacific to the Asiatic coast and from the Aleutian Islands down to New Zea-

land, almost every prominent port of the islands in the Pacific Ocean having been visited.

Though this vessel had no auxiliary power whatsoever, but had to depend entirely upon her sails for motive power, and in spite of the fact that she encountered at times most terrific storms, only one accident befell the party. While at Yokohama the *Galilee* was blown by a typhoon during the night of August 24, 1906, against the breakwater, such damage being sustained that the vessel sank in about fourteen feet of water, the party and crew being obliged to take refuge in the lighthouse on the breakwater and remain there until the storm had subsided. The vessel was, however, at once drydocked and the repairs pushed, so that ten days after the accident she left Yokohama for a 6,000-mile cruise to San Diego, California. Not a single life was lost throughout the entire time.

The *Galilee* is now to be returned to her owners, and it is noted with gratification that Dr Bauer's plea for a vessel especially adapted for ocean magnetic work (see article above referred to) has met with success. The Carnegie Institution has undertaken to build a vessel, in the construction of which very little iron will enter. The plans are now being drawn by Mr Henry J. Gielow, naval architect and engineer, of New York, and it is expected that this new vessel, to be called the *Carnegie,* will be ready in time to resume the ocean magnetic work a year from now, this time in the Atlantic Ocean.

THE NORTH AMERICAN INDIAN

THE first two volumes of Mr. Edward S. Curtis' work on the "North American Indian" have appeared, Volume I describing the Apache and the Navaho, and Volume II the Pima, Papago, Mohave, Yuma, Maricopa, Walapai, and Apache Mohave. An advance announcement of this work was given in the July, 1907, number of this Magazine. Mr Curtis, it will be remembered, is making an ethnological study and a photographic record of all Indians in the United States and Alaska still living in a primitive state. His illustrations are to appear in twenty quarto volumes, accompanied by twenty portfolios, each containing forty large photogravures. The work possesses great historical and ethnical value, for Mr Curtis describes and pictures the Indians in their everyday life, showing their customs, their games, and ceremonial life in a complete detail never before attempted. The foreword is by President Roosevelt, while the work is edited by Mr F. W. Hodge.

The Apaches, who at present number about 6,000, for the most part live in the White Mountain Reservation of Arizona. Though their number probably never exceeded 10,000, they were for many years the scourge of a large region in Arizona and New Mexico. The name "Apache" is one of the most notorious and widely-advertised of Indian names, but very little was known about the inner life and customs of the tribe until Mr Curtis obtained the friendship of their elders, and was by them initiated into many of their traditions and ceremonies. He had the good luck of being in the Apache country when the new "messiah craze" was at its height in 1906, and gives an interesting account of the religious ecstacy of this primitive folk. At present many of the Apaches are working for the government on the great Salt River irrigation project in Arizona.

The Navahoes, who are also described in Volume I, next to the Sioux, are the largest Indian tribe in the United States. They are self-supporting, and own large flocks and herds. They have been the least affected by civilizing influences. Mr Curtis calls the Navaho "the American Bedouin," and says he asks nothing of the government except to be unmolested in his pastoral life.

The nine tribes treated in Volume II reside within the limits of Arizona, but extend into the Mexican state of Sonora and into eastern California.

The Yuma and the Mohave, whose homes are on the banks of the mighty Colorado, are usually fine specimens

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THE APACHE

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CHIEF GARFIELD: JICARILLA—APACHE

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JICARILLA—APACHE MAIDEN

physically, being large boned, strongly built, and clear skinned. Within a short distance of them, in the high altitudes, live the Walapai, of the same family. They are the direct opposite of the river Indians—hardy mountain types, physically and mentally quick of action, for their rugged mountain home has ever demanded of them a hard fight for existence. Adjoining them, in Cataract canyon of the Colorado, are the Havasupai, also of the Yuman family, whose surroundings are truly unique. Though they cultivate small patches in their canyon home, for subsistence they depend much upon the chase, and, like the Walapai, are a wiry mountain people. The Maricopa, another Yuman tribe, who have long lived in the valley of the Gila, exhibit the effect of their Colorado river origin, both in physique and in their slowness of thought.

The Pima from earliest tradition have dwelt within the Gila drainage in southern Arizona. From one point of view they are ideal Indians—industrious, keen of mind, friendly to civilization, and tractable.

These various tribes have been broadly termed with the Pueblos, the sedentary Indians of the Southwest. Most of them came early in direct contact with Spanish missionaries, whose ministrations they received in friendly spirit, yet after more than two centuries of zealous effort little has been accomplished toward substituting the religion of the white man for that of their fathers. True, many are professed adherents of the Christian faith, but only in rare instances has an Indian really abandoned his own gods. As a rule the extent of their Christianization has been their willingness to add another god to their pantheon.

The Pimas and Yumas and their allies were the builders of those wonderful monuments of the Southwest which indicate that a great population formerly lived there, and has since been dispersed.

It is very fortunate that a man like Mr Curtis is able to make a historical record of the Indians before they have been obliterated.

BOOKS RECEIVED

Outdoor Pastimes of an American Hunter. By Theodore Roosevelt. New and enlarged edition. Pp. 420. 6¼ x 9½ inches. Illustrated. New York: Charles Scribner's Sons. 1908. $3.00.

The California Earthquake of 1906. Edited by David Starr Jordan. Pp. 360. 9 x 6 inches. Illustrated. San Francisco: A. H. Robertson. 1907. $3.50.

California and the Californians. By David Starr Jordan. Pp. 48. 7 x 5 inches. San Francisco: A. H. Robertson. 1907. $0.75.

The Alps of the King-Kern Divide. By David Starr Jordan. Pp. 22. 7 x 4¾ inches. San Francisco: A. H. Robertson. 1907. $0.75.

The Mother of California. By Arthur Walbridge North. With an introduction by Cyrus C. Adams. Being a historical sketch of the little-known land of Baja, California, from the days of Cortez to the present time, depicting the ancient missions therein established, the mines there found, and the physical, social, and political aspects of the country, together with an extensive bibliography relative to the same. Pp. 169. 6 x 9 inches. Illustrated. New York: Paul Elder & Co. 1908. $2.00.

American Communities and Co-operative Colonies. By William Alfred Hines. Second revision. Pp. 608. 5½ x 8 inches. Illustrated. Chicago: Charles H. Kerr & Co. 1908.

The American Constitution. The national powers, the rights of the states, the liberties of the people. By Frederick Jesup Stimson. Pp. 259. 5¼ x 7¾ inches. New York: Charles Scribner's Sons. 1908.

Report of the Coast and Geodetic Survey. Showing the progress of the work from July 1, 1906, to June 30, 1907. Washington: Government Printing Office. 1907.

Water Resources of Alabama. By Eugene Allen Smith. Prepared in co-operation with the United States Geological Survey. 1908.

In Indian Mexico. A narrative of travel and labor. By David Starr. Pp. 425. 9½ x 6½ inches. Illustrated. Chicago: Forbes & Co. 1908. $5.00.

Mexico, with comparisons and conclusions. By A. A. Graham. Pp. 283. 5¼ x 7¾ inches. Topeka, Kans.: Crane & Co. 1907.

To the Top of the Continent. Discovery, exploration, and adventure in sub-arctic Alaska. The first ascent of Mount McKinley, 1903–1906. By Fred. A. Cook. Pp. 321. 6¼ x 9½ inches. Illustrated. New York: Doubleday, Page & Co. 1908. $2.50.

Retrieval at Panama. By Lindon W. Bates. Pp. 554. 6¼ x 9½ inches. New York: The Technical Literature Co. 1907.

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NÉSJAJA HATÁLI: NAVAHO

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LUZI: PAPAGO

Panama. A personal record of forty-six years, 1861–1907. By Tracy Robinson. Pp. 282. 5¾ x 8½ inches. Illustrated. New York: The Star and Herald Co. 1907.

A Satchel Guide to Europe. For the vacation tourist in Europe. A compact itinerary of the British Isles, Belgium, Holland, Germany and the Rhine, Switzerland, France, Austria, and Italy. By W. J. Rolfe. Pp. 308. 3½ x 6¼ inches. Maps. Boston: Houghton, Mifflin & Co. 37th edition. 1908. $1.50.

Atlas of European History. By Earle W. Dow. Pp. 46. 7½ x 10¾ inches. New York: Henry Holt & Co. 1907.

Over-sea Britain. A descriptive record of the geography, the historical, ethnological, and political development and the economic resources of the empire. By E. F. Knight. Pp. 324. 5¾ x 8¾ inches. Maps. New York: E. P. Dutton Co. 1907. $2.00.

An Englishwoman in the Philippines. By Mrs Campbell Dauncy. Pp. 350. 6 x 9 inches. Illustrated. New York: E. P. Dutton & Co. 1906. $3.50.

Highways and Byways in Kent. By Walter Jerrold. Pp. 447. 5½ x 8 inches. Illustrated. New York: Macmillan & Co. 1907.

London Parks and Gardens. By Hon. Mrs Evelyn Cecil. Pp. 384. 6½ x 10¼ inches. Illustrated. New York: E. P. Dutton & Co. 1907. $6.00 *net.*

Seeing England with Uncle John. By Anne Warner. Pp. 492. 7¾ x 5¼ inches. Illustrated. New York: The Century Co. 1908. $1.50.

Notes Upon the Island of Dominica. (British West Indies.) Containing information for settlers, investors, tourists, naturalists, and others. By Symington Grieve. Pp. 126. 7½ x 5 inches. Illustrated. New York: Macmillan Co. 1906.

Ancient Italy. Historical and geographical investigations in Central Italy, Magna Græcia, Sicily, and Sardinia. By Ettore Pais. Translated from the Italian by C. Densmore Curtis. Pp. 441. 6¼ x 9½ inches. Illustrated. Chicago: The University Press. 1908. $5.00.

Through Italy with Car and Camera. By Dan Fellow Platt. Pp. 486. 6¼ x 9 inches. Illustrated. New York: G. P. Putnam's Sons. 1908.

Lands of Summer. Sketches in Italy, Sicily, and Greece. By T. R. Sullivan. Pp. 249. 5¼ x 7⅞ inches. Illustrated. Boston: Houghton, Mifflin & Co. 1908. $1.50.

Three Weeks in Holland and Belgium. By John U. Higinbotham. Pp. 275. 5 x 7¾ inches. Illustrated. Chicago: The Reilly & Britton Co. 1908.

The Tragedy of Russia in Pacific Asia. By Frederick McCormick. 2 volumes. Vol. 1, pp. 435; vol. 2, pp. 479. 6½ x 9¾ inches. Illustrated. New York: Outing Publishing Co. 1907. $6.00 *net.*

The Russian Peasant. By Howard P. Kennard. Pp. 302. 7¾ x 5¼ inches. Illustrated. Philadelphia: J. B. Lippincott & Co. 1908.

Leon, Burgos and Salamanca. A historical and descriptive account. By Albert F. Calvert. Pp. 151 and 462 illustrations. 7¾ x 5½ inches. New York: John Lane & Co. 1908.

The Soul of Spain. By Havelock Ellis. Pp. 420. 5¾ x 9 inches. Boston: Houghton, Mifflin & Co. 1908. $2.00.

In Korea with Marquis Ito. By George Trumbull Ladd. Pp. 477. 5¾ x 8¼ inches. Part I, A narrative of personal experiences. Part II, A critical and historical inquiry. Illustrated. New York: Charles Scribner's Sons. 1908. $2.50.

Benares: The Sacred City. Sketches of Hindu life and religion. By E. B. Havell. Pp. 226. 9 x 6¼ inches. Illustrated. 1905.

Wanderings in Arabia. By Charles M. Doughty. Being an abridgement of "Travels in Arabia Deserts." 2 volumes. Vol. 1, pp. 309; vol. 2, pp. 292. 9 x 6 inches. Imported. New York: Charles Scribner's Sons. 1908.

Ice-bound Heights of the Mustagh. An account of two seasons of pioneer exploration and high climbing in the Baltistan Himalaya. By Fanny Bullock Workman and William Hunter Workman. Illustrated. Pp. 444. 9½ x 6½ inches. Imported by Charles Scribner's Sons. 1908.

White Man's Work in Asia and Africa. A discussion of the main difficulties of the color question. By Leonard Alston. Pp. 136. 5¼ x 7½ inches. New York: Longmans, Green & Co. 1907.

In the Land of Mosques and Minarets. By Francis Miltoun. Pp. 442. 8¼ x 5¾ inches. Illustrated. Boston: L. C. Page & Co. 1908. $3.00.

Today in Palestine. By H. W. Dunning. Pp. 278. 5⅝ x 8¼ inches. Illustrated. New York: James Pott & Co. 1907. $2.50.

From the Niger to the Nile. By Boyd Alexander. 2 volumes. Vol. 1, pp. 358; vol. 2, pp. 420. 7¼ x 9½ inches. Illustrated. New York: Longmans, Green & Co. 1907.

Doing Over. A tour eastward around the world, January to August, 1906. By F. M. Huschart. Pp. 318. 5½ x 7¾ inches. Illustrated. Cincinnati: The Robert Clarke Co. 1907. $2.00 *net.*

From West to East. By Sir Hubert Jerningham. Pp. 351. 6 x 8¾ inches. Illustrated. New York: E. P. Dutton. 1907. $4.00.

Climate. Considered especially in relation to man. By Robert DeCoursey Ward. Pp. 372. 5¾ x 8½ inches. Illustrated with diagrams. New York: G. P. Putnam's Sons. 1908. $2.00 *net.*

The Complete Mountaineer. By George D. Abraham. Pp. 492. 9 x 6 inches. New York: Doubleday, Page & Co. 1908. $4.80.

Race Life of the Aryan Peoples. By Joseph P. Widney. 2 volumes. Volume 1, The Old World, pp. 347; volume 2, The New World, pp. 359. 6 x 9¼ inches. New York: Funk & Wagnalls Co. 1907. $4.00.

The Mongols. By Jeremiah Curtin. Foreword by Theodore Roosevelt. Pp. 412. 6¼ x 9¾ inches. Boston: Little, Brown & Co. 1908. $3.00.

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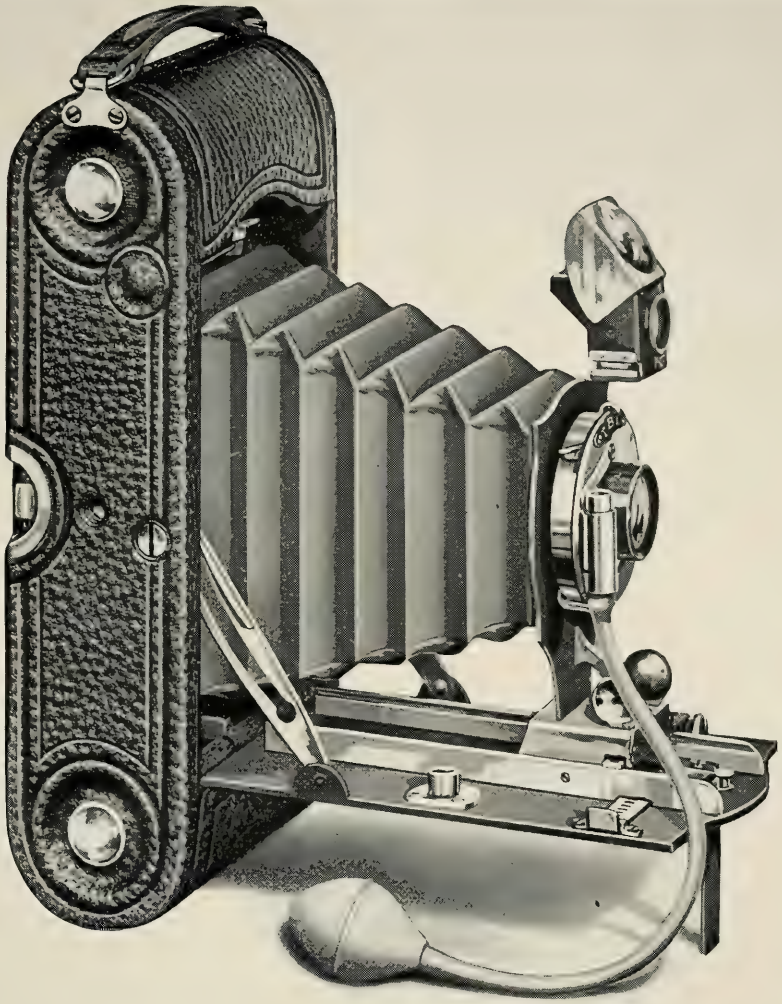

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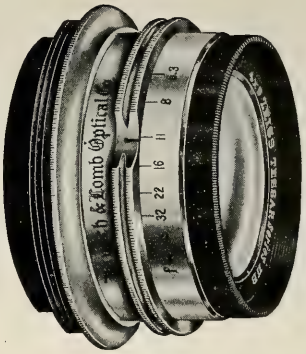

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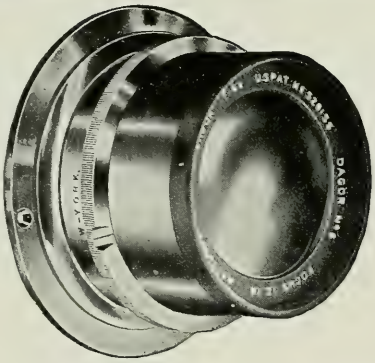

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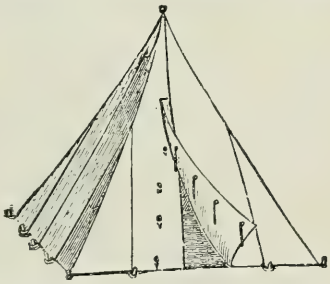

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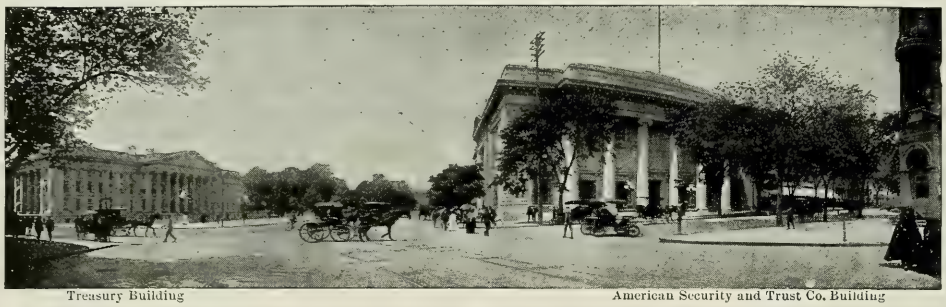

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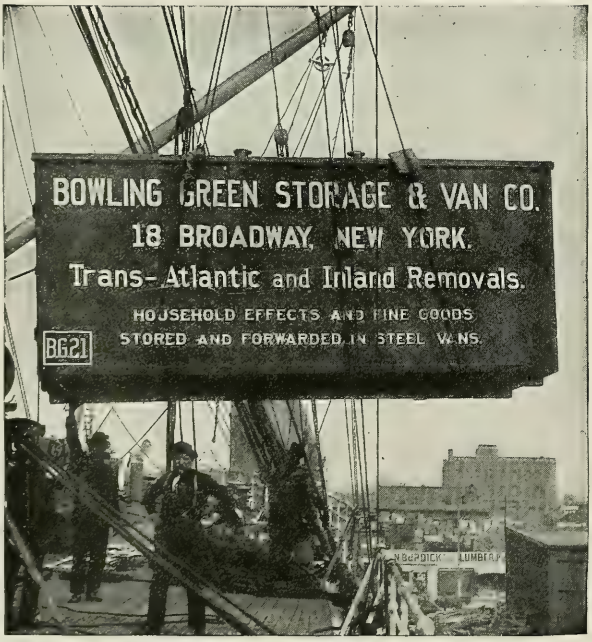
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Photographs by Professor Ferdinand Ellerman, of Carnegie Institute Solar Observatory, Mount Wilson

IN Mount Wilson, the home of the great Carnegie Institute Solar Observatory, Los Angeles and vicinity possesses what may be justly termed the greatest pleasure mountain of any populous section of the globe.

Towering at an altitude of 6,000 feet above Pasadena, Los Angeles, and the many towns and verdant ranches of the San Gabriel Valley, this remarkable mountain has gained distinction in the world of science as the destined home of the largest lens in existence. But it has other claims which need no astronomical art to reveal, and which, while enchanting the eye of the world-traveled tourist, are of greatest value to the vast area of homes whose scintillating fairyland of lights this sentinel of the Sierra Madre nightly overlooks.

It is doubtful whether as great a variety of appealing views can be enjoyed from any other mountain of the world, but it is the wonderful accessibility of Mount Wilson to the thousands of beach and valley homes outspread beneath its pine-clad summit and the remarkable climatic and physiographic change possible within half a day that makes it "the magic mountain" in the people's fancy.

A change of mind at breakfast and a change of speed at Sierra Madre from the Pacific Electric of the city to the "Burro" Pacific of the trail, and the resident of Los Angeles is able to eat luncheon over a mile nearer the heavens; may look out upon a sea of clouds, darkening the city below, and at night may see the glow of the light by which the ones at home are reading.

A plunge in the Pacific and snowballing and sled-riding before night has become such a common story with residents of this favored district as to excite no comment, and at night they can pick out the several buildings of the beach resorts over forty miles away by rail, finding it hard to realize that they were there but a few hours previous.

There is practically no end to the variety of wild mountain and canyon scenery offered by the Mount Wilson trip, but there are four general panoramic views which arouse the enthusiasm of the visitor, and each of distinctly different nature.

Looking to the south, a hundred-mile vista of valley, ocean, and shoreline reveals the buildings of Los Angeles and Pasadena flashing in the sunlight, the

distant Catalina, San Nicholas, and Santa Barbara Islands, the mountain and coast landmarks of San Diego and the country to the east, where flourish Pomona and Ontario.

On clear days the line of the breakers as they play upon the beach has been discerned by the naked eye, the arrival of the Catalina boat at San Pedro harbor noted, and on a few exceptional mornings the buildings on Catalina have been visible, 60 miles away.

Looking to the north, vast ranges of rugged mountains in the immensity of their trembling bareness suggest to the mind the upheaval of the earth's creation, and with a skyline of eight to eleven thousand feet stand between the eye and the Mojave Desert beyond.

The magnificent watershed of the San Gabriel River stretching away to the east is a foreground for the majestic whiteness of San Antonio ("Old Baldy"), and farther eastward San Gargonia ("Grayback"), San Bernardino, and San Jacinto are prominent landmarks.

Directly back of Mount Wilson to the north the West Fork of the San Gabriel River finds its source in the bottom of a gigantic bowl, the three-thousand-foot sides of which, under the softening touches of a waning sun, make a dream-like picture not soon forgotten, calling as from another world to the tired-out worker but a few hours removed from the turmoil of Los Angeles.

The rush of the tumbling West Fork can be heard on Mount Wilson, and in summer this back country is a favorite camping ground for those who wish to lose themselves from civilization and burn their bridges behind. The mail, the telephone, and the telegraph are of another world; the use of the razor is tabooed; the daily packing and driving the burro is the only problem of life, and the business man returns to civilization in such a happy state of carelessness that he is passed on the streets unrecognized by his nearest friends.

Except for patches of woods here and there and streaks of green in the canyon bottoms, these gigantic heaps of brownness look as dry as the desert, but there are ever-flowing springs to be found on the highest ridges, and trails lead through the most impossible looking regions.

Covered with sugar pines, bearing giant cones over a foot long, Barley Flats and Pine Flats are two of the enchanted regions which beckon to the Mount Wilson Hotel guest, leading him yet a step farther from civilization. Both are well watered at an altitude of over 6,000 feet, are covered with wild barley, and are reached by the roughest sort of mountain trails.

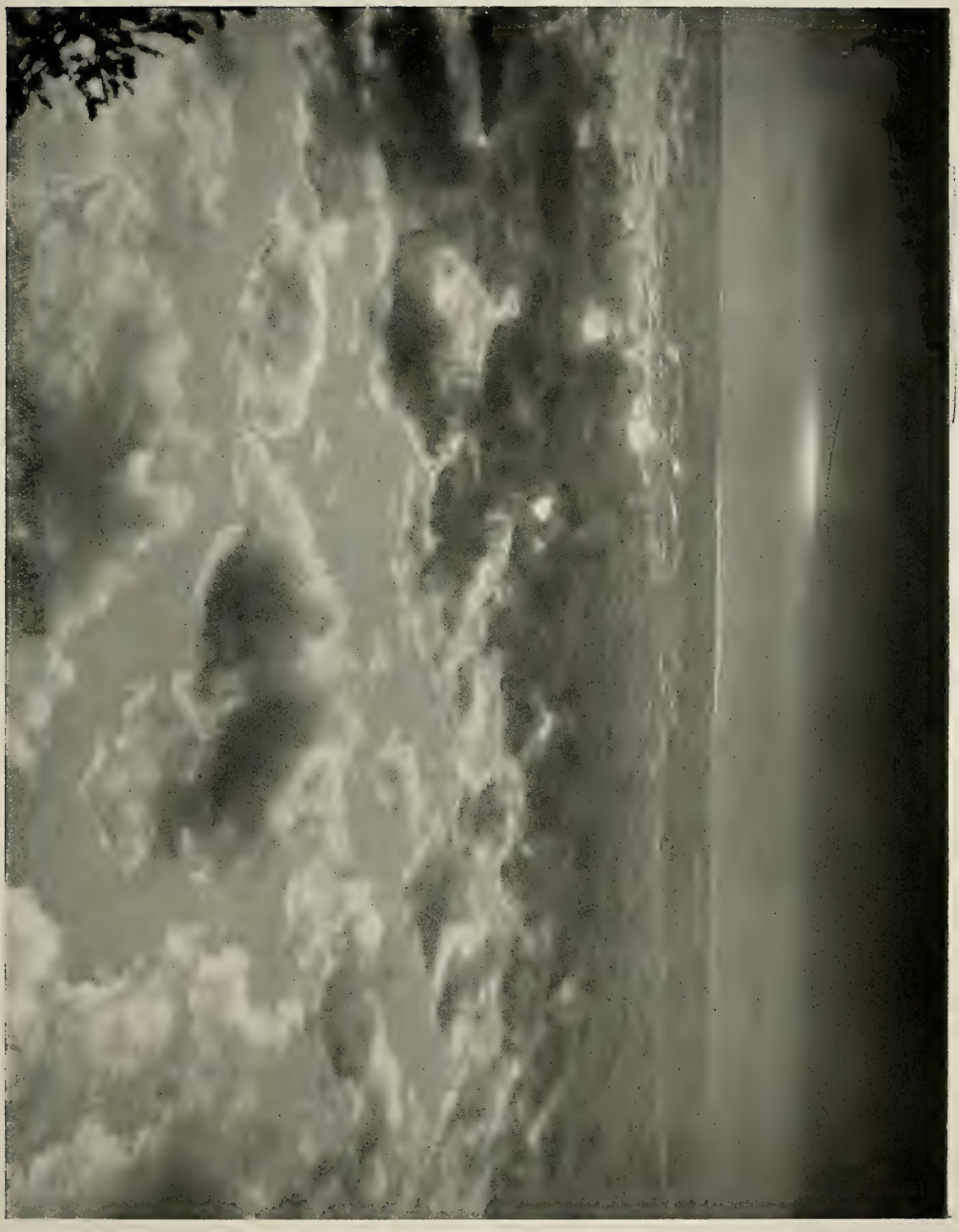
Gently rolling over the semi-flat country of this high ridge, the green carpet and pine grove of Barley Flats are so entirely different from the steep and rugged bareness of the surrounding country that the imagination seems to lift one into another country, and one half expects to see the fairy prince of nursery days ride forth in gorgeous trappings and blow a blast upon his trumpet.

This picturesque spot really has its romance in "The Horse Thieves of Barley Flats." These hardy outlaws of days gone by are reported to have operated between the Mexican border and San Francisco, using this well-watered grove of pines, commanding an extended view on all sides of any possible approach, as one of their feeding stations.

The grain which the stolen horses didn't eat is supposed to be responsible for the fine crop of volunteer barley which is now enjoyed by the hardy little burros of the Mount Wilson Hotel Company, for Barley Flats, which is in the government reserve, is leased as a fall and winter pasturage when the absence of the summer colony lessens the need of trail animals.

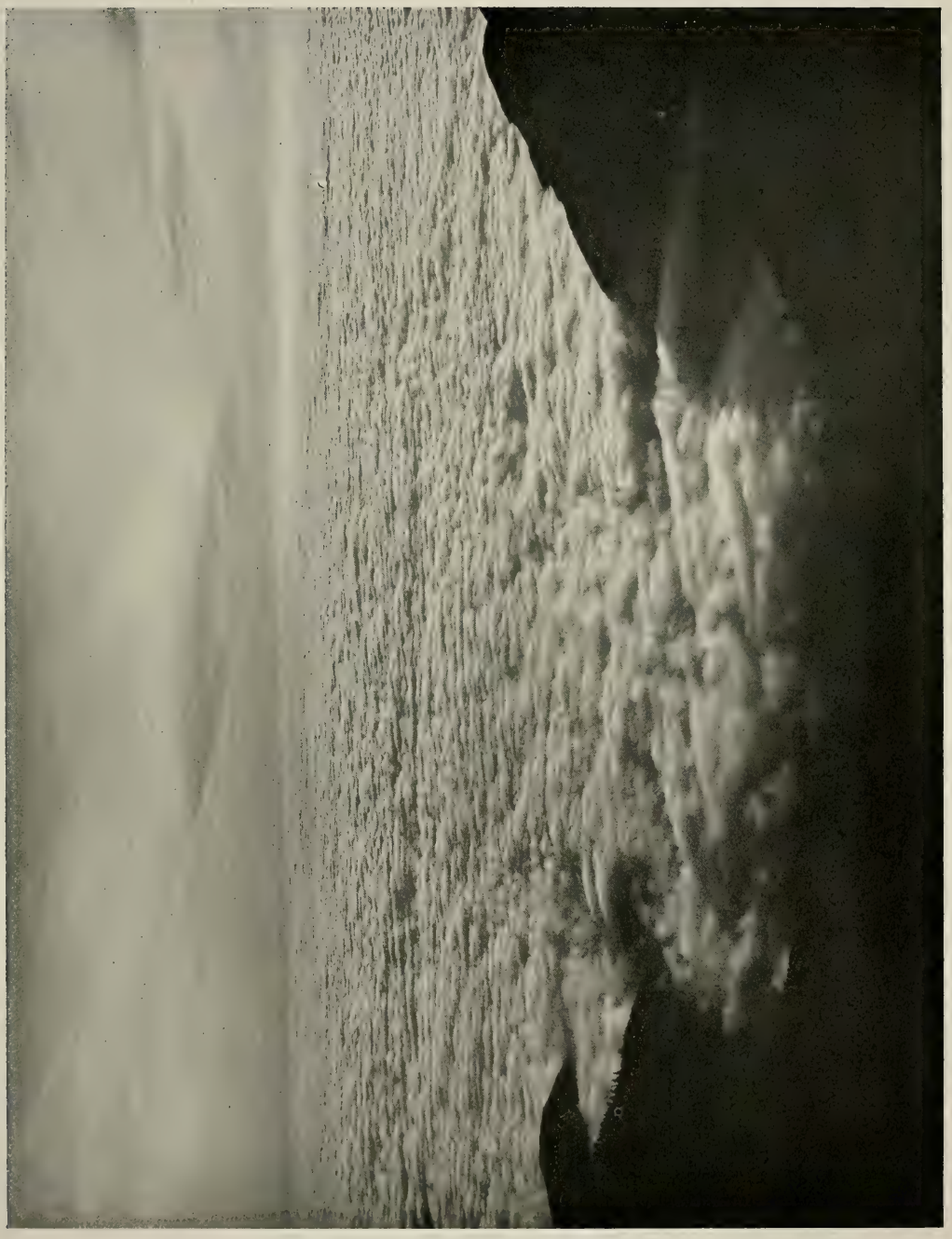
The burros are counted daily by telescope from the hotel, and if any do not answer to roll-call a rider is dispatched to see whether a mountain lion is at large. When the heavy snow comes, the burros are brought back to civilization, the rescue expeditions having a tough time battling with the snow-drifts.

The record fall of eight feet in Jan-



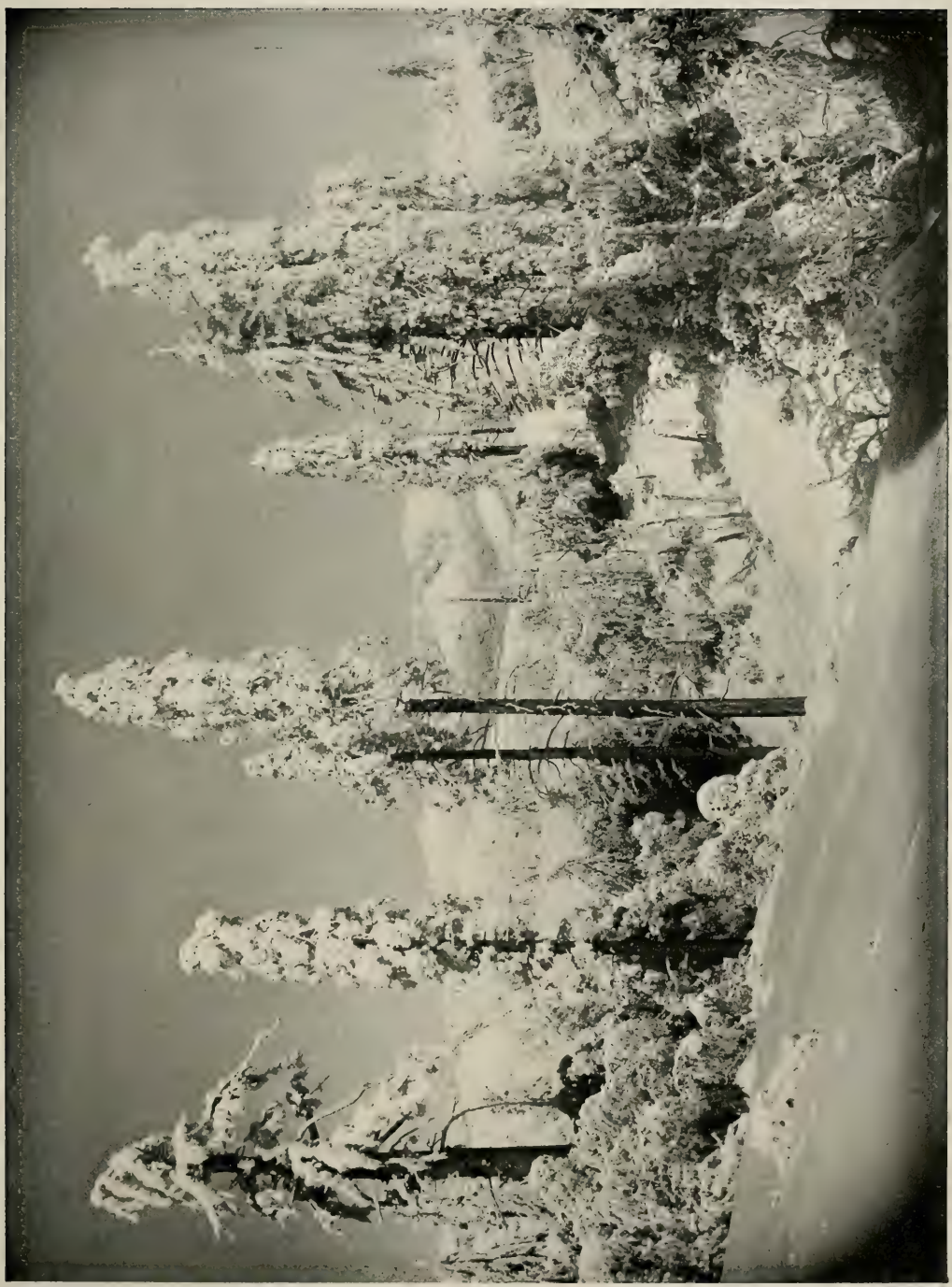
SUNSET FROM MOUNT WILSON

SEA OF FOG FROM MOUNT WILSON, LOOKING TOWARD SAN ANTONIO OR "OLD BALDY"



SEA OF FOG: FROM MOUNT WILSON

A STORM IN THE MOUNTAINS



ENTITLED SNOW YUCCA

COTTAGES: MOUNT WILSON IN WINTER

MOUNT WILSON HOTEL AND COTTAGES IN WINTER

Thousands each winter here enjoy old-fashioned winter pleasures, many never having before handled snow. Mount Wilson is three hours from Los Angeles to peak, one hour by trolley, and eight miles of trail

SAN ANTONIO OR "OLD BALDY" IN WINTER FROM MOUNT WILSON

NIGHT VIEW FROM MOUNT WILSON

Los Angeles, 17 miles; Pasadena, 8 miles; beach towns, 38 miles; 31 towns can be seen from here on a clear night

uary, 1907, caught the hotel people unawares, and a dozen of the patient toilers of the trail perished before the relief expedition could break its way through.

When a sea of fog is hiding the sun from the valley beneath and the peaks around Mount Wilson are revealed as islands in the midst of a vast ocean, it is hard to recall the extensive valley and ocean panorama of a few hours previous, when the green checker-board squares of cultivated ranches and the white smoke of the locomotive colored the broad level of the landscape. Mount Harvard, closely joined to Mount Wilson by a saddle and well wooded with spruce on the near side, lends greatest value to the cloud scenes, while Mounts Lowe, Markham, and San Gabriel rear their successive elevations in one, two, three order to the west.

Gradually lifting as the day advances, the level sea of fog will often break into the fluffy billowyness of shifting clouds just as the setting sun lends rose-colored tints of loveliness. Pouring over the connecting ridges and downward into the canyons about Wilson's Peak the fog, in the twinkling of an eye, forms waterfalls and rapids, and, filling into the West Fork Valley across the Sierra Madre range, constructs beautiful rivers.

The night view from Mount Wilson is doubtless unequaled by any other mountain of the world. The star-lit heavens upside down is at once suggested to the amazed tourist, who is overcome by the unexpectedness of the sparkling area of electric lights beneath him. Pasadena, eight miles distant in an air line, spreads her scintillating splendor almost to the foot of the mountain, and is connected by bands of whiteness with Los Angeles and the nearer beach towns of Venice, Ocean Park, and Santa Monica. Long Beach and San Pedro, over thirty miles away, are plainly revealed, and the location of over thirty cities and towns can be determined by their lights.

Not the least feature of Mount Wilson as a pleasure mountain for the people of Los Angeles and vicinity is the eight-mile trip by trail from the old foothill town of Sierra Madre to the peak. To those accustomed to the dryness of the valley and coast region, and who have their sole idea of the mountain from the bare southern face of the range revealed to the cities below, the wild freshness of the Little Santa Anita Canyon is a wonderful surprise.

The grateful, refreshing sound of tumbling water greets the ear, beautiful waterfalls appear in the deep canyon below the trail, the rocky banks are green with moss and ferns, and the plentiful profusion of pine, spruce, and mountain oak is a welcome surprise. Deer have been killed within two hours of Los Angeles, and the wildcat is frequently seen on the trail.

Whether the stubborn burro or "Shanks' mare" is depended upon, the excursion furnishes one of the most complete and quickest changes from the atmosphere of civilization to be found near any large city of the world. The general dryness of southern California renders the transition all the more noticeable and welcome.

NOTES ON A ZOOLOGICAL COLLECTING TRIP TO DUTCH NEW GUINEA*

By Thomas Barbour

Illustrated with photographs by the author.

NEW GUINEA, the last great area remaining in the tropics which is still almost completely unknown, has a peculiar charm for the naturalist. To be sure, its coasts have been, and are still, frequently visited and settlements exist on parts of the island, but great stretches of seaboard still remain unmapped and all but a small part of the interior is a blank on our charts.

The unfamiliarity of the average American with the whole East Indian Island region, and especially hereabouts, will perhaps be an excuse for giving a few general facts regarding the island. Lying as it does between the Equator and Queensland, Australia, its length is about 1,490 miles and its maximum breadth is 430 miles. Its area is greater than that of Borneo, being about 300,000 square miles. Politically it is divided into three parts.

The lower coasts bordering Torres Straits form British Papua, as it is now called. The eastern coast as far as 140° 47′ east longitude, with a considerable hinterland, goes to make up Kaiser Wilhelms Land, or German New Guinea. In both of these districts there are a considerable number of white settlements and mission stations; and mining and copra farming are carried on. The great western region of Papua is Dutch and it is of this region that we are dealing especially.

The Dutch section attracts the student of zoölogy, ethnography, or geology particularly. The presence of snow mountains, whose slopes have never yet been trodden by white man's foot, conjures up in the imagination endless dreams as to what new forms of life may there await a discoverer. Several well-equipped expeditions sent out by the Dutch scientific societies or by the government have failed to even reach the bases of these mountains.

Owing to the extremely unhealthy climate and the character of the natives, the Hollanders have not attempted to administer this territory as the English and Germans do theirs. Other island possessions, nearer at hand and far more valuable from every point of view, have done much to retard the Papuan trade, and now only a couple of times a year do subsidized trading vessels visit this coast. Three Residents, one stationed at Dorey, one at Fak Fak, and one at Merauke, each with a small garrison of Javanese troops, serve to represent the sovereignty of Holland over this vast region.

It is this very absence of white folk which gives this land an added interest, for here the native may be seen in his primitive simplicity. With such a bewildering variety of human types among the Papuan tribes, each speaking its own language, the ethnologist has a great field, one which is certainly unexcelled. The writer has visited the northwest and west coasts of the island with his wife and two friends, who volunteered their aid in collecting, and Chinese and Javanese helpers.

Leaving Soerabaia, in Java, a long and beautiful sail, with stops at many islands almost as interesting as our goal, brought us to Ternate, one of the old settlements of the Moluccas. Here the series of contract stops was about finished, and, thanks to the kindness of officials high in the Dutch Indian service and to the officers of the Koninklijke Paketvaart Maatschappij, we started on a number of visits to many villages, lying in bays abounding in glorious scenery and where the natives had, in some cases, seen no white men in several years. Mrs Barbour was always the greatest source of inter-

* Copyright, by Thomas Barbour, 1908

PAPUANS AMONG THE LITTLE COLONY OF TRADERS

They are grouped about the Dutch Resident's house and the barracks for the half company of Javanese soldiers. The man dressed is our interpreter; he belongs to a different tribe. Dorey, New Guinea.

est, for, of course, the only white women who had ever been on this coast before were the wives of the little band of Dutch missionaries who have settled near Dorey, and these women had only been seen by the Papuans of that immediate vicinity. To attempt to give a nominal list of the stations where collecting was carried on would be as uninteresting as futile, for the names of many villages do not even occur on the Dutch Admiralty charts.

No words, however, can begin to do justice to the splendid scenery of parts of the coast. In the Pitt Passage, between the islands of Salwatty and Batanta, steep wooded hills rise from the sea on each side of the ship. A white coral sand beach and an occasional house perched on stilts in the water complete this scene, while over the bow the coast of Papua shows as a dim, low bank, as if a forest were growing from the sea. The vegetation is rank in this alluvial land, high timber, matted with creeping vines, covered with masses of orchids and rising from a bed of ferns being the feature which one encounters as soon as shore is reached. We must not forget the birds, splendid lorys, parrots of red and blue and green, white cockatoos, and gorgeous pigeons greet one's first ramble ashore.

MAGNIFICENT BUTTERFLIES

It was the writer's good luck on his first stroll to find a tree flowering high in air which was being visited by a host of the splendid bird-winged butterflies, *Ornithoptera poseidon*. The feelings of one who has hitherto only known these visions in black and green and gold as they lay pinned in a cabinet were never better expressed than by Wallace, who wrote in his Malay Archipelago the following, after he had taken this species in the Aru Islands: "I had the good fortune to capture one of the most magnifi-

NEW GUINEA OR PAPUA

PAPUAN WOMEN

The women of Dorey are well dressed, mainly through the efforts of Mr van Hasselt, for 43 years a missionary in Papua. No converts are made, except where a few slaves are purchased and adopted. The only effects are seen in the help which modern medicine has been to them; though it must be said that none of these races are ever as healthy as before they submitted to clothing.

cent insects the world contains, the great bird-winged butterfly (*Ornithoptera poseidon*). I trembled with excitement as I saw it coming majestically toward me, and could hardly believe I had really succeeded in my stroke till I had taken it out of the net and was gazing, lost in admiration, at the velvet black and brilliant green of its wings, seven inches across, its golden body, and crimson breast." At Sorong these were flying very high, as is their wont, but by climbing the tree and using a small collecting gun and dust shot, out of a number brought down, some almost perfect ones were obtained. Later we got the chrysalides and splendid examples emerged after about thirty days.

In coming to Papua from Malasia it is the sudden contrast in the people which makes the most startling impression on one's mind. The Malay, grave, reserved, and dignified, is as unlike his New Guinean neighbor as a Chinaman is unlike a European. These islanders are a happy, boisterous lot until some little thing offends them, when they at once become sullen and treacherous; but as we had no occasion to cross them, we got along most admirably. They often helped us collect with real enthusiasm, a set of rude drawings of various beasts showing them for what we would barter.

Over all Dutch New Guinea tobacco, or "sembacoo," as the natives call it, is the most sought for "trade." Next in popularity comes brass wire, then cloth, red being demanded in some localities and blue in others. Beads and knives are also most useful. The tobacco is put up for this trade in Rotterdam, marked "The Rising Hope" (in Dutch), and contained in a blue wrapper; curiously enough any other sort is absolutely refused by the people. They smoke it and chew it. They are very fond of walking up to you and taking a cigar or cigarette directly from your mouth and walking away puff it with perfect unconcern. When going ashore every article of value (from the Papuan standpoint) must be left behind. The conception of the difference between *meum* and *teum* is not definite, and to try to keep a thing from a native by force is—well, a proceeding of doubtful safety.

In the extreme northwest of New Guinea and on the neighboring island of Waigiu the people are similar. Here has taken place the longest intercourse with the Malays, for until the Dutch came, the Sultan of Ternate was suzerain of this part of Papua. There has been a mingling of blood, as is shown by some individuals being of a lighter color than is common, and also by the occasional occurrence of wavy instead of curly hair.

The pure Papuan is very dark brown, usually a well-built, thick-set man of medium height. Occasional individuals are seen who are slight, short, and who have strongly marked Negrito characteristics. These probably represent survivals of the very earliest human inhabitants of the region, as were the Negritos in the Philippines. Out on the Pacific coast toward German territory the human type is markedly different. Here in varying degrees we meet people who have characteristics of other island groups to the eastward, for there have probably been accidental colonizations along this shore by both Melanesians proper and Polynesians. To attempt to describe these physical types would be beyond the writer's powers and the scope of this paper; the photographs serve to illustrate this point.

The houses which these people build are of much interest. They are generally well made, often with attempts at artistic decoration, and always most picturesque. In the northwest the Malay type prevails. We find each family with its own house. This is placed on poles out in the water with sides of "attap," or pandannus mat, and roof of thatch. This thatch is made by taking sago palm leaves and braiding the blades all on one side of the midrib. These are then laid on as clapboards would be, and make an excellent water-tight roof.

COMMUNAL HOUSES

In Geelvink Bay, at Dorey, Roon, or on Jobi Island the regular house is a long communal structure. These great "turtle-back" houses shelter from 80 to 100 people. They eat and sleep generally in

a long corridor, which runs lengthwise through the building, while on each side lead off small rooms, in which the private belongings of each family are stored.

The men lounge regularly on the front piazza, often lying prone with spear or bow and arrow ready for any fish which may happen by. The people show most wonderful skill in striking or shooting into water; they seem to be able to allow for the refraction to a nicety. The women work on the back piazza, nearest the forest-covered shore—convenient agents to spread the alarm should an attack be made by some marauding land tribe. The canoes are moored at the front of the house. Evidently the Papuan warrior looks first to his own safety.

On Wiak Island the houses were of another sort; similar in shape, they were set in two different positions. Some were over the water, as we had often seen before, while others were set on high bamboos among the trees of the deep forest. These houses were generally three-roomed, one opening out on each end, and a third between these having a side door. We saw little of the people or their doings. They have a very bad reputation for treachery. The women were shy, hiding always deep in the bush and our photos here were very unsatisfactory.

Whenever the women came out to meet the ship along with the men we felt quite safe to go ashore and wander at will through the deep pathless forests; but here at Meosboendi only men came out in the canoes, armed men carrying many spears, bows, and quivers full of short bone-tipped arrows. They were drinking heavily of their home-brewed "sagoeir" and were in a generally bad frame of mind. A few on shore stood for their picture, but most would not, and the women ran off helter skelter and took refuge in their high houses.

On a previous trip the captain of the trading steamer was standing on the beach leaning against a tree, when a Wiak man walked up and drove his spear through him. For some years the Dutch government prohibited trading with these people as a measure of reprisal, and we left safe and sound after what was one of the first trips since the ban had been removed. At Korido, a village near Meosboendi, on Sook Island, the people on a previous trip had met the steamer with a shower of spears. No trading by white people has ever been done here and we did not attempt a landing. That an occasional Malay trading prau gets this far was testified by the fact that many of the Papuan had spear-heads of iron, shaped as are the spear-heads of the Buginese Malays about Makassar.

From Wiak it is a short journey to Jobi Island, another of the group which lies in the mouth of Geelvink Bay. The people here vary little in appearance from the other Papuans of the region, but their manners and customs differ much from village to village. Indeed, while this island is hardly larger than Long Island, New York, eleven mutually unintelligible languages are spoken on it. Many feuds exist, and when our ship came to anchor in Pom Bay, canoes attracted by the smoke and which had come from neighboring harbors did not spend the night even close to the ship, because their occupants were afraid of the people of Pom.

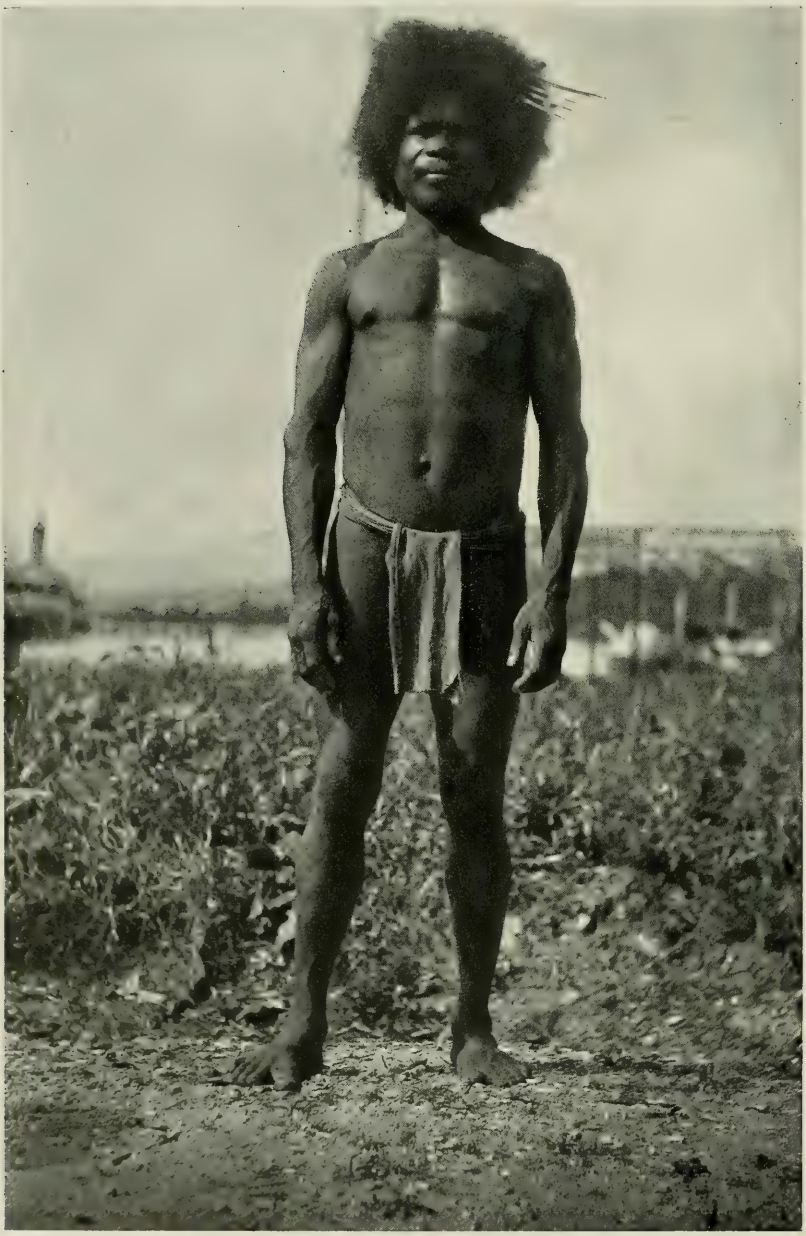
In the houses here a goodly number of heads were seen, the products of recent raids. In one house we tried to barter for some of these, but through a man who could speak Malay we learned that, as the possessors claimed, these people whose heads we saw had been such notorious villains that the Dutch gunboat last seen had brought permission for this tribe to go and kill them. Of course, their heads must be kept as proof of the meritorious act. No gunboat had visited the bay for years! The heads were fresh.

CANOES

The raiding canoes of Pom were enormous affairs, with bows decorated with fretwork carving, in elaborate designs, and with wooden heads which were made to look like real ones, by having enor-

PAPUANS NEAR THE MISSION AT DOREY

They are considered civilized for New Guinea, and are very erratic. One moment a coat or pair of trousers may be worn and the owner be proud of his finery; the next they are thrown into the bushes as a nuisance



A PAPUAN OF DOREY

In his hair may be seen the ends of the prongs of a hair comb, which is made from the wing spines of the cassowary. Notice the space between the great and second toe. For ladders, poles are used in which notches are cut for the toes.

ONE OF OUR BEST PAPUAN HELPERS AT DOREY

This man was a good collector and may be seen here proudly displaying his pay. A knife, a tin can, and a key on a string he was almost as proud of as of his splendid head of hair and the decorated bone pin which he had thrust through his nose.

MEN OF DOREY

The man on the right has in his hair the comb which is in general use among all Papuans. It resembles a long-tined fork and is made of split bamboo, or more often of the long spine-like feathers, which are found on the side of the cassowary where most birds have wings.

THE END VIEW OF A COMMUNAL "LONG HOUSE" NEAR DOREY

The decoration on the end shows the space for the separate rooms. The corridor through the middle of the house is the common lounging place. One wonders how it is possible to use the bridge; the poles roll about and there is no hand rail; still it is done, and even by young children.

PAPUAN CHILDREN

The children are at home in the water at a very early age. They often paddle about alone in tiny dug-out canoes of their own

mous mops made of cassowary feathers stuck to them.

A word about New Guinean canoes is in order here. They vary among the different tribes as do all the other products of their handicraft. In some places they have a single outrigger, in others two. At Djamna and the Humboldt Bay they are elaborately decorated with figures at bow and stern, and often with conventional designs burned on the hull representing sharks and flying fishes. Here again the photos show better than verbal descriptions the way these crafts are put together and their varying types. The basis of all is a great hollow log prepared with fire, and often still with the primitive stone axe. To the sides of this are sewn two strips of wood, which go to form the gunwales. In almost every case where the canoes are sailed, sails made of woven pandannus leaves are used. A tripod generally serves as a mast among the Geelvink Bay islands. The paddles of this region are short-handled and devoid of ornamentation, while at Humboldt Bay they are long, so that a man may paddle standing. Here also they are often most beautifully carved.

For weapons the bow and arrow are general. In some places they are as elaborate as human ingenuity can devise, the arrow shafts decorated with burned and incised designs, ornamented with tufts of feathers, often from the Birds of Paradise, and with tips of bone or burnt wood. These tips are elaborately carved with many series of barbs and are certainly savage-looking weapons.

They are not knowingly poisoned, but we are told that they are thrust into the body of a dead warrior and left to absorb some of his valor. The valor is doubtless most effective in causing in this damp equatorial climate swift and sure blood-poisoning.

Spears are often used, as well as arrows. Some are bamboo, like great cheese scoops, while others are tipped with human bones or the shin-bones of cassowaries. Shields occur sporadically and not many of the tribes in Dutch territory know of them. The people of Wiak make them long and narrow for parrying; they have crude designs daubed on them with native pigments, and on top they are surmounted with a grinning face and mop of cassowary feathers for hair. Daggers are only known in Humboldt Bay. They are made of thigh bones, usually, splintered to a sharp point on one end, with the other end worked

PAPUAN CANOES

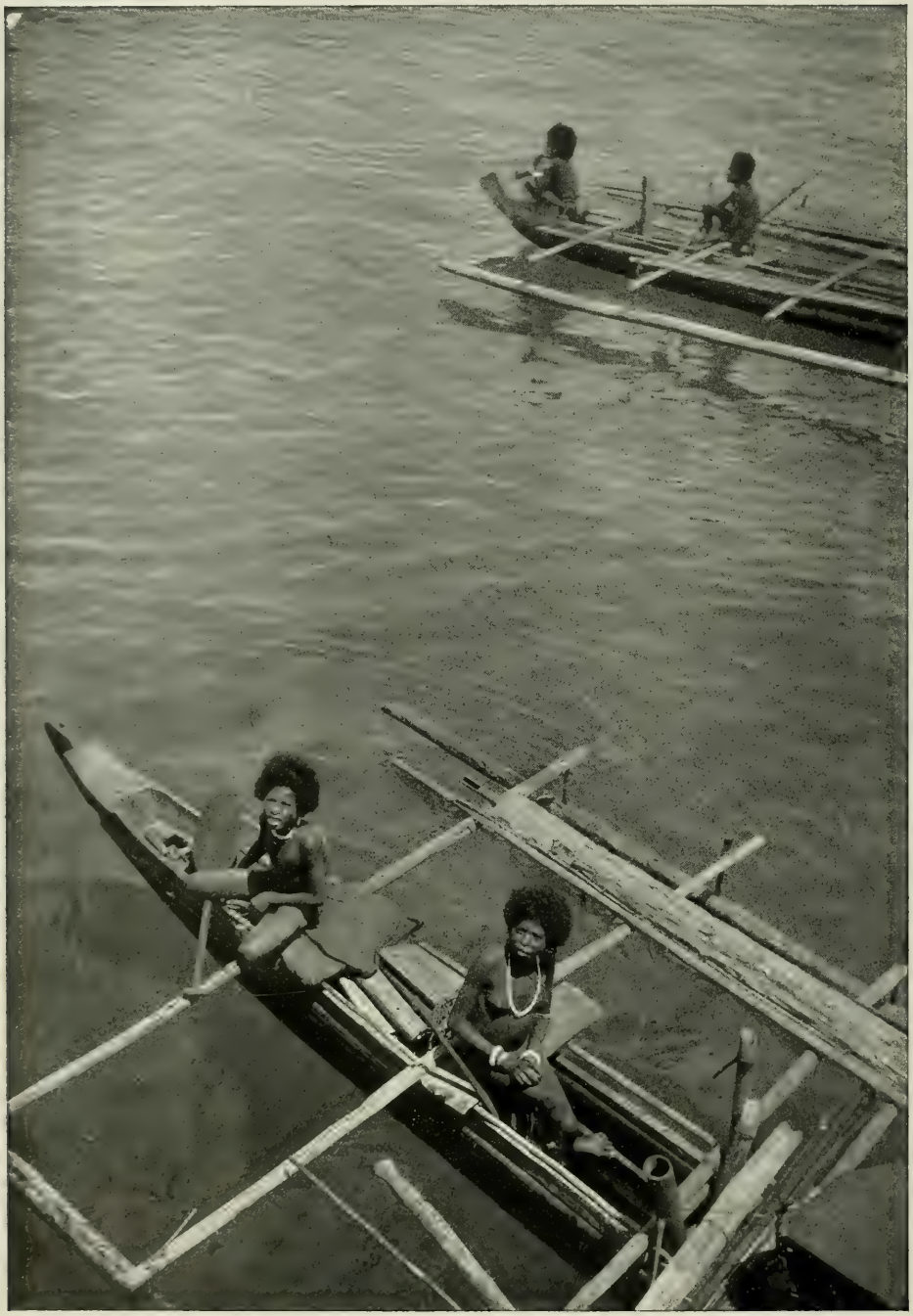
The people rest themselves by folding up; they never sit as we do. Note the tripod for holding the mast

smooth for a handle. They also are often beautifully carved.

The artistic sense of these people is strongly developed, and the amount of time and pains which will be spent in decorating every gourd or joint of bamboo for household use is astonishing. Their tools, of course, are the most primitive, for of metals most of them know nothing.

The religious life of the people is still very imperfectly known; here again a great field awaits the student of ethnology. Their methods of burial vary greatly and are interesting, to us often disgusting. These subjects, along with an account of the little-known tribes at Djamna and Humboldt Bay, will be touched on in a subsequent paper.* The author will feel that he has been more than repaid for the discomforts of this trip if he has awakened an interest among Americans in this wonderful region—a country which, in spite of drawbacks in its climate, its notorious unhealthiness, and its often rather inhospitable or even dangerous inhabitants, will always remain the most interesting region he has ever visited.

*To be published in the August number of this Magazine.

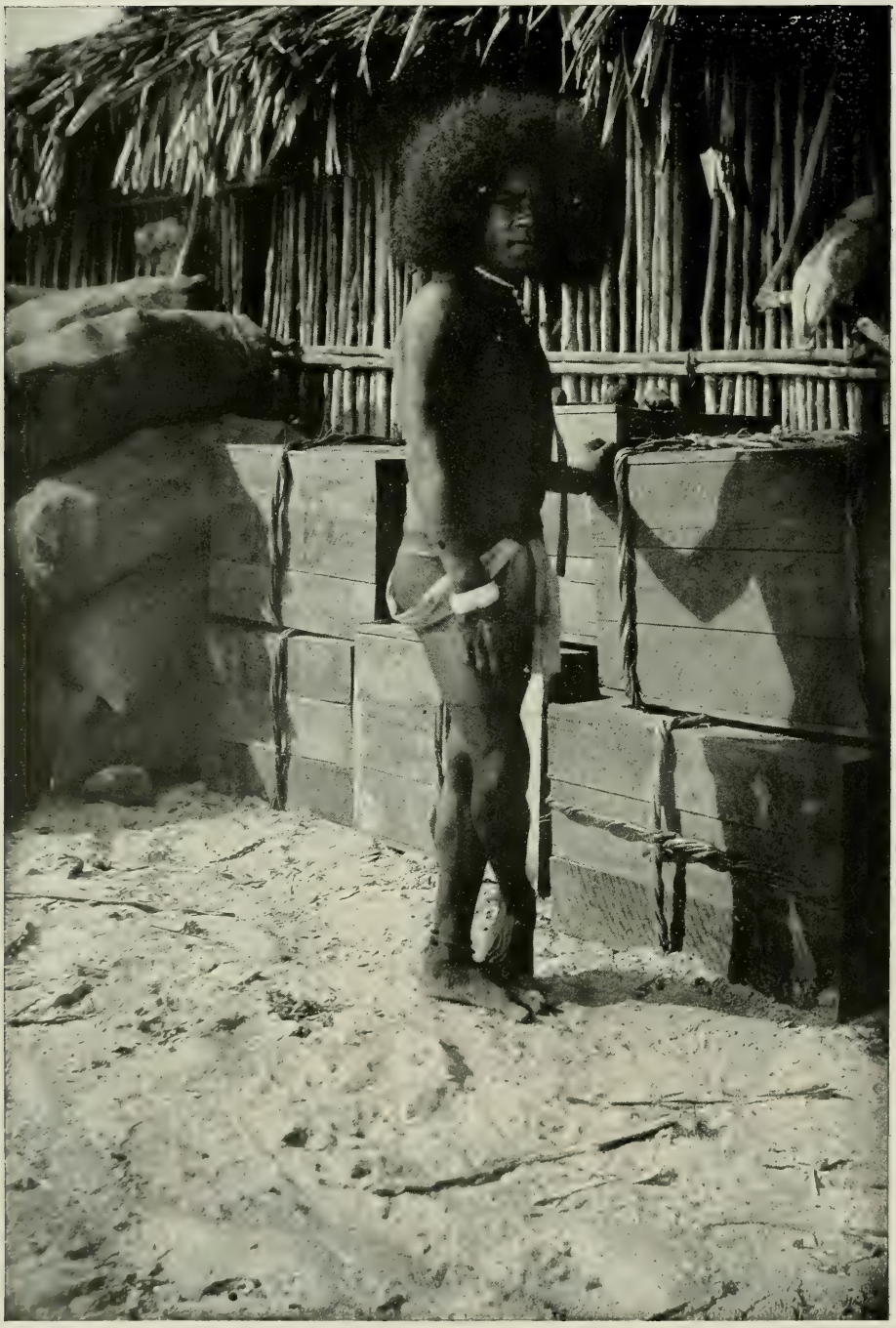


JOBI ISLAND WOMEN

Photograph taken from the ship's deck. It was a sign of great confidence for the women to come so near; they are generally most shy

A WIAK ISLAND CANOE

Note the pandannus-leaf sails rolled on the outrigger stays. The spears stand ready for use in a joint of bamboo. The roof-like object in the canoe is a rain coat, a long hood of pandannus mat which is hung from the head down the back. The people dislike water in every form.



ONE OF THE SURLY MEN OF MEOSBOENDI, WIAK ISLAND

In the boxes was the dammar gum which these people collect and which the ship's crew pack up and take on board after it has been paid for in "trade." These people are one of the most dangerous in the whole region to have any dealings with.

AMONG THE MAHOGANY FORESTS OF CUBA

By Walter D. Wilcox

Author of "Camping in the Canadian Rockies," "The Rockies of Canada," Etc.

THE Bay of Cochinos, on the south coast of Cuba, is about forty miles west of Cienfuegos. It is the largest protected bay in Cuba, with a length of over 15 miles and an average breadth of about four miles, great depth of water, and very fair protection from the sea, and it is surprising at the first glance not to find a thriving port town located here. On the contrary, this is one of the wildest and most sparsely populated parts of Cuba.

Until within a few years this bay was said to be the resort of brigands and bad characters of all kinds; the waters were supposedly infested with sharks and other dangerous fish and the shores with crocodiles, while the swampy interior was the reputed breeding place of innumerable mosquitoes. The days of piracy are past, and while crocodiles and sharks do abound, no fatalities have ever occurred.

The isolation of this region, to which may be attributed the vagueness of these evil reports, is due to the fact that this entire coast is hemmed in by a line of almost impassable swamps more than fifty miles in length, called the Cienaga de Zapata, which cut off communication with the interior. Then, too, the comparatively new city of Cienfuegos, situated on its beautiful land-locked bay, which Humboldt pronounced one of the most magnificent harbors in the world, has served as an outlet for the adjoining region.

In connection with the purchase of a timber tract on this bay, I had abundant opportunities to learn many interesting facts about the region. On the first visit a small boat was engaged to sail from Cienfuegos. Under the influence of a fresh land breeze, the forty miles westward along the rocky coast were run in the night, and early the following morning the boat was well within the Bay of Cochinos and approaching a low, flat shore covered by a uniform expanse of green forest. Above the tree-tops the sky was a rosy red in the early dawn. It was a typical midwinter day in the tropics—the bay smooth as a mirror; the cool air laden with forest odors and the perfume of flowers, while the chattering of wild parrots could be heard from the shore. Our captain entered a small river or inlet and poled the boat to a convenient landing place.

A year later, at this same spot, a landing was made with a force of carpenters and laborers and a cargo of lumber and tools. A place was cleared in the forest for a house, docks were built, gardens laid out, wells dug, and eventually a permanent home made, comfortable enough to house my family during the succeeding eighteen months.

In all that time we were not molested by the natives, and no case of illness occurred in any member of the household. It seems that malaria and yellow fever are unknown among the natives of this entire region.

HERONS, WHITE EGRETS AND CROCODILES

The encircling shores of Cochinos Bay are low and flat. The west shore is a sandy beach four or five feet above the water. This coast is often a mere strip of dry land separating the bay from swampy tracts and lagoons full of mangrove trees. Herons and various wading birds, including the white egret, sought for its feathers, abound here in great numbers. Hunters shoot the latter bird by the hundreds, unfortunately in the breeding season, because the feathers are then at their best, and only the inaccessible nature of these lonely lagoons and the plague of insect life prevent their total extinction.

Crocodiles likewise abound, and in the night-time may be heard catching birds near the water's edge. During the last two years some eight or ten men have been constantly employed killing crocodiles in the depths of the swamps and carrying on a profitable business selling their hides. In the remote parts of the swamp, where the great reptiles have never been disturbed, they are easily killed. An old hat is placed on the end of a short stick, which is held in the left hand and waved over the water. The crocodile rushes blindly at the hat and is struck a sharp blow behind the head with a machete.

Sharks infest these shores and often swim in the water so shallow as to become half stranded on the sandy shoals. Natives say that in the old days this bay was a resort for pirates and slave traders, and that the sharks were originally attracted by the large numbers of dead and dying slaves thrown overboard.

IN THE MAHOGANY FOREST

The east shore is entirely different, totally devoid of sand beaches or swampy tracts, and is a rocky plain from five to ten feet above sea-level, covered by a heavy forest, which extends eastward three or four miles to the edge of the swamps.

The number of species of trees is very great, and, while including such splendid varieties as mahogany, sabicu, ebony, and Spanish cedar, there are many other hardwoods, probably 150 in number, some of which are very rare or quite unknown to experts in tropical timbers. Some of these trees have a wood harder than ebony, and the best steel axes are frequently broken in felling them. Many are fine-grained and beautifully banded and veined with two or more colors, and are susceptible of a high polish.

The mahogany and cedar are imposing trees, the latter sometimes reaching a diameter of seven feet. Their massive branches, hung with purple and yellow orchids, bromeliads, ferns, and other parasitic plants, are the resort of parrots and other birds of brilliant plumage. In contrast, the silent swamps present a different aspect. The forest is interrupted by stretches of open prairie, by slow-flowing streams of great depth and clumps of heavy trees, hung with long shrouds of gray Spanish moss or overrun by climbing cactus, mistletoe, and orchids, which in early spring make a gay display of white, yellow, and purple blossoms. The royal palm here reaches its maximum size, the stately trunks, symmetrical as Grecian columns, rising more than a hundred feet to spread their crowns of foliage in the glistening sunshine above the dark and sombre forest.

The swamp water, having general currents toward the sea and eventually escaping by underground channels, is clear and perfectly wholesome, with, however, a slight taste and color of vegetable matter. Many of these lagoons are very picturesque, especially where long vistas open up in the forest and display the overhanging foliage dipping down to the water surface. These black pools are occasionally disturbed by the splash of a crocodile or the rising of the "sevalo," a kind of fish that comes from the sea through subterranean passages and rivers which drain the swamps.

The general land surface, while perfectly level, is rocky and the soil is very scanty, being apparently washed down into the numerous cracks and joints in the rocks. It seems remarkable that trees of great size can and do grow on such little soil, and one often sees their long roots spreading over the ground for twenty yards or more in search of some hole or crevice to descend. The soil, however, is remarkably fertile, and such plants as reach down deep enough to be independent of surface conditions of moisture and drought succeed admirably. Bananas, limes, and oranges of delicious flavor and quality are raised in several places near the bay. Vegetables and small fruits succeed only when sufficiently watered, as the light, porous soil dries out very quickly. The rocks are entirely of coral formation, very hard and rough on the exposed surface, but underneath turning to a soft, yellow

Photo by Walter D. Wilcox

HAULING MAHOGANY LOGS FROM THE FOREST: COCHINOS BAY, CUBA

Photo by Walter D. Wilcox

A FIELD OF CORN IN A CLEARING

Six months before this picture was taken the field was covered with a dense tropical forest: Cochinos Bay, Cuba

stone made up of shell fragments and corals similar to existing beaches on the western shore of the bay.

Outside of two or three poisonous plants, these forests contain very few dangers of any kind. The poisonous manzanillo tree spreads its picturesque branches out over the rocky shores and drops its green apples into the sea. Certain fish eat these apples, and in some cases, when caught at the critical time, have caused fatal cases of poisoning. The milky juice is feared by every Cuban axeman, who will never under any circumstances fell one of these trees, a single drop in the eye being sufficient to cause total blindness. Snakes are abundant, but universally harmless, while the sting of Cuban scorpions and centipedes is little worse than that of honey-bees. One native nearly ninety years old has spent forty-five years on his clearing in these woods and is still strong enough to do all his work.

THE CHANGE OF SEASONS

At the close of winter, in March and April, the forest loses a great part of its foliage, while some varieties of trees shed their leaves altogether. This period marks the close of the dry season. The entire forest when seen from a distance is suffused with a reddish glow, as the old leaves fall and the new ones burst from their buds. This is in many respects the finest part of the year in Cuba, an uninterrupted succession of bright sunshiny days, with an ideal temperature both day and night. The forest revels in a profusion of flowers, one kind of tree succeeding another in its time of blossoming, and the air is sweet with the

Photo by Walter D. Wilcox

SEMI-PIRATICAL SEA CAPTAIN OF A TRADING SCHOONER ON THE SOUTH COAST OF CUBA

Most of the traffic between small settlements on the south coast of Cuba is carried on such craft

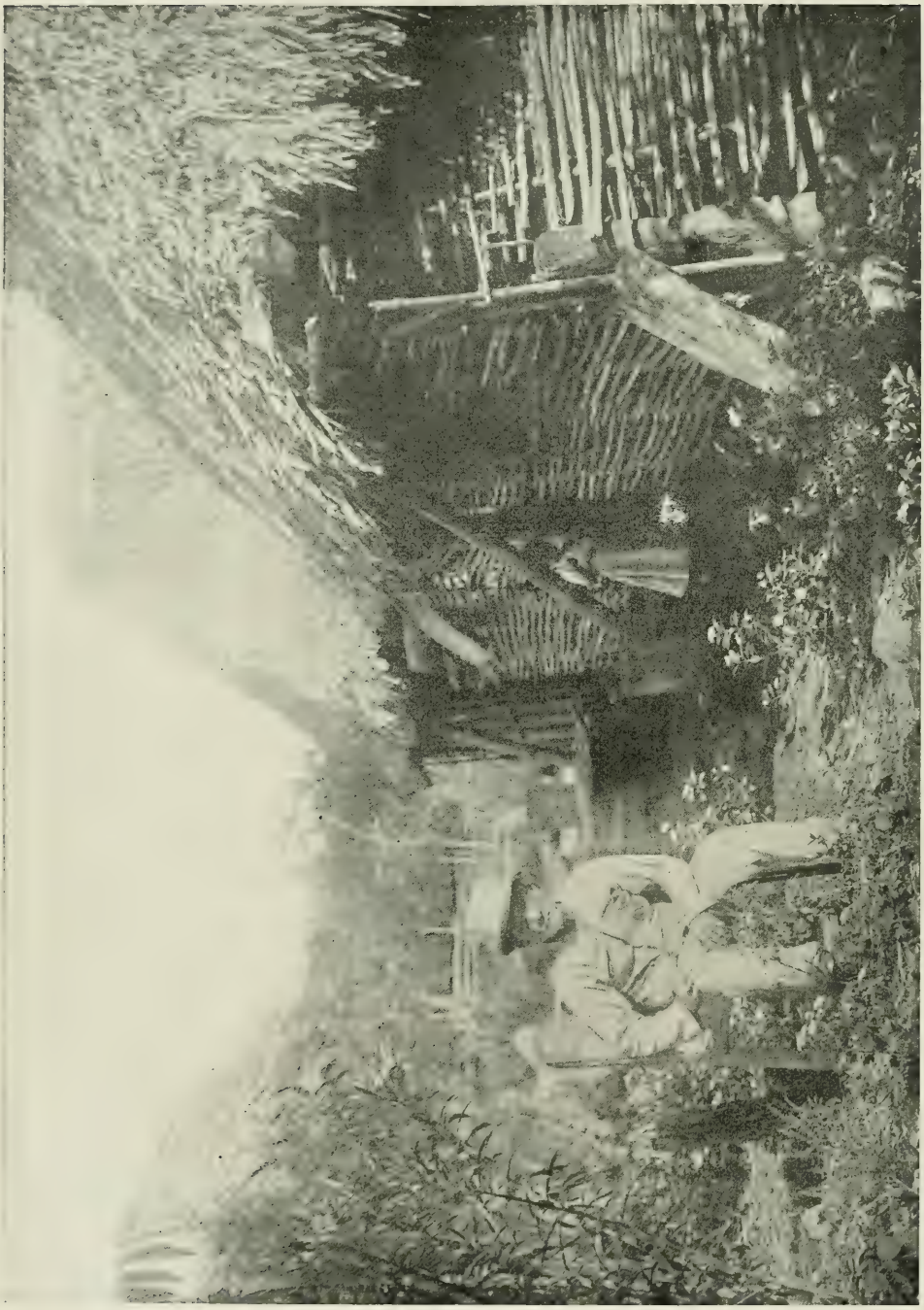


Photo by Walter D. Wilcox

OLD MAN AND A TYPICAL NATIVE HOUSE: COCHINOS BAY, CUBA

scent of countless blossoms. The majagua tree, famous for its green wood and fibrous bark, from which the strongest ropes are plaited, is brilliant with tulip-like blossoms of fiery red color; the baria is hung with masses of white, and the roble, the so-called Cuban oak, is adorned with clusters of delicate pink and white flowers, resembling the mountain rhododendron. The dull hum of honey-bees tells of the harvest of nectar, and at this season the natives are kept busy pressing honey and melting wax.

The variety of birds is very great at this period, as the Florida species, driven south by the cold of winter, have not as yet returned to the north, and the native birds are singing and mating. The Cuban crows call one another with a great variety of peculiar sounds and modulations, which one could easily fancy to be a kind of conversation among themselves. and the parrots come in noisy flocks of several hundreds and drive away by their loud chattering all thought of sleep after the earliest trace of dawn.

Emerald-colored humming birds dart from flower to flower on the gaudy hibiscus bushes or poise in midair amid the pink clusters of the coral vine. Many of the wild birds are sociable, and I have seen four or five different kinds at one time on or near the verandas of the house.

MISERABLE POVERTY OF THE FEW NATIVES

The natives of this region are a mixed race, rather dark in color and with a probable mixture of considerable negro blood. They live in miserable houses thatched with palm leaves, generally without windows or other protection from insects and weather. They are excellent woodsmen, handling the axe and machete with great skill. They think nothing of walking ten or fifteen miles on the most trifling errand. Many have small clearings where they raise bananas, yucca, and a kind of sweet potato. These fruits and vegetables, together with their live stock and beehives, eked out by the results of hunting and fishing, give them an uncertain and miserable diet. When they are fortunate enough to get work, they buy provisions; but a little stock in the cupboard is a temptation to quit working at once. It would be difficult to find a lower standard of diet and general living outside of savage tribes.

From lack of care and cleanliness, the teeth of these people decay and fall out before middle age, and their monotonous diet causes suffering from digestive troubles. Like all Cubans, they are very fond of pets, and it is no uncommon thing to see all the ordinary animals of the barnyard—goats, pigs, turkeys, chickens, etc.—wandering at will inside their houses. On an iron hoop suspended from a rafter a tame parrot may usually be seen, while many houses have a kind of rat-like animal, called the "jutia," which lives in the forest trees, tied up as a half wild and treacherous pet. Naked children sprawl about on the floor and many dogs, in a state of extreme emaciation from continued starvation, howl at every passer-by and add to the general misery. Were it not for the balmy temperature and the continued sunshine and general cheerfulness of the Cuban climate, these people would rapidly become extinct. In such hovels, abounding in filth and squalor, one meets with evidences of genuine hospitality in marked contrast to the surroundings. The stranger is invited to enter, offered the best chair, and coffee is prepared at once. Cuban coffee is roasted in small quantities and ground just before making. A cloth bag holds the ground coffee while hot water is filtered through it several times. The resulting coffee, while strong and excessively roasted, has a very fine aroma and flavor. Rather than be deprived of his coffee and cigarettes, a Cuban would prefer to go several days with little or no food.

In the huts of these humble people great formality, an inheritance from the Spanish, is observed on arriving and departing. Withal there is general ignorance, few being able to read or write, and their life is woefully monotonous, though they seem light-hearted and happy, prattling for hours about the most trifling

events in their daily life. They observe frequent holidays in connection with church festivals, birthdays, etc., and delight in dancing and music, the latter being barbaric and showing strong evidence of African origin. They believe that the moon has a great effect on the planted seed, and sometimes one sees an umbrella carried at night to ward off the evil effects of moonlight.

CHARTING COCHINOS BAY

A systematic survey with plane-table and alidade was made, with the purpose of preparing a chart of Cochinos Bay. All the preliminary work was done in a sail-boat, which proved a very tedious and uncertain method of working. Later, a motor boat was used, without which it would have been impossible to make systematic soundings. It was necessary to traverse every part of the coast on foot, and as the entire east coast is a rocky ledge, worn by the elements into a rough slag-like surface, called "diente de perro," or dog's-tooth coral, sometimes no more than a quarter mile could be charted in a day's work.

Three rivers enter the bay, besides several small streams. The larger rivers are in every case the mouths of underground streams, which drain the swamps and, breaking out near the coast, run the last part of their course in open rivers, called "caletas," which are deep-water inlets or coves. These are filled with salt water, as the tide enters and even penetrates underground and makes the water brackish more than a mile inland. Only in the height of the rainy season, when for several months the current has a velocity of four or five miles an hour, does the water in these "caletas" become partially fresh. The largest is Caleta Rosario, on the east coast of the bay. It is half a mile long and from 150 to 400 feet wide, with a minimum depth of over six feet, thus providing a safe refuge in stormy weather for small schooners.

REMARKABLE DEPTH OF COCHINOS BAY

As existing charts do not show the depth of water in Cochinos Bay, considerable time was spent in gathering sufficient data to make the work fairly complete. A wooden reel with sounding line was made and the first sounding taken one-quarter mile west from Caleta Rosario. The entire line, 900 feet in length, was run out without reaching bottom, and this surprising depth necessitated making a stronger apparatus and considerably reduced the number of soundings finally taken.

When it is remembered that all the surrounding land for probably forty miles in every direction is a level plain, ten or fifteen feet above sea-level at most, the great depths of this bay are remarkable. At one point, about the middle of the east shore, only one-third of a mile from the land, a depth of 1,245 feet was discovered. No soundings were attempted in the middle of the bay, as the great depth of water resulted in a resistance on the sounding apparatus that made the work impracticable. From an analysis of the soundings made, it seems probable that the greatest depths will be found to reach 2,500 or 3,000 feet. If drained of water, Cochinos Bay would appear as a deep and comparatively narrow valley, with canyon-like and frequently precipitous walls on its eastern side.

About ten miles due south of the bay, there is a small island, called Cayo Piedra, with a lighthouse visible nine miles. From this point northwesterly to the west side of the bay there is a long line of shoals, which serve to inclose the bay from the effects of southwesterly seas. The deep-water entrance between these reefs and the east shore is 3½ miles wide, and only in times of southeasterly gales do heavy seas sweep into the bay; but even then their force is rapidly dissipated, till at the upper parts their influence is rarely felt. Great depth of water and coral rocks make poor anchorages, as a general rule; but with local knowledge of good ground or by use of fixed anchors, ships can ride out the severest gales in the upper part of Cochinos Bay as safely as in a completely land-locked harbor. There are no

THE DAY AFTER THE CYCLONE OF OCTOBER 17, 1906: COCHINOS BAY, CUBA

Photo by Walter D. Wilcox

exposed rocks or dangerous reefs within the bay itself, except immediately adjacent to the shore, and ships can safely enter this bay on the darkest nights, hugging the east shore within 100 yards if necessary, in perfect security.

A simpler way of getting an idea of the depth of water in Cochinos Bay would be to imagine the water level to fall 25 feet. This would hardly change the position or form of the east coast. The west shore, however, would advance about a quarter of a mile at the upper end of the bay and gradually increase to two miles at Punta del Padre, and then run ten miles seaward in a southeasterly direction to Cayo Piedra, making the west coast about twenty-five miles in length. The bay would then appear a very long and narrow, almost land-locked, body of very deep water. The tide averages less than eighteen inches. West of the south end of the bay there are vast lagoons, with innumerable small islands entirely covered with mangrove trees. The water varies from eighteen inches to several feet in depth, and my launch being of light draft, it was found practicable to explore these island seas without difficulty. Charts do not correctly show the great extent nor true form of this interesting region.

WONDERS OF TROPICAL MARINE LIFE

Among the beautiful shells of the west-coast sand beaches were pieces of spongy volcanic rock, purple and green in color, which may have had their origin in the eruptions in Martinique.

As may be imagined, the water in this deep bay is of the utmost purity and clearness. The color is blue, rivaling that of the Mediterranean, and the bottom may be clearly seen in forty or fifty feet of water. The wonders of tropical marine life afford a never-ending source of delightful study. On bright, calm mornings one can look down through fathoms of crystal water and see the sunlight sparkling on snow-white beds of coral sand. Among branching corals, Neptune's cups, sponges, and purple sea-fans, fish of many strange forms and colors may be seen gliding to and fro, apparently within grasp of the hand—the blue llora, the red and green parrot-fish, the red-snapper, and the spotted cherna. On moonlight nights, moving rapidly through the water in a launch, one feels as though sailing over an enchanted sea of crystal, where every ripple is faintly outlined with phosphorescent fire.

The bay is a fisherman's paradise. The rapacious and dangerous picua is caught by trolling from rapidly moving sailing craft, but still fishing in deep water gives better results. Sharks often bite fish off the hooks before they can be landed, unless the line is taken in rapidly. Sea turtles of several varieties and the shell-bearing tortoise abound, the Cuban tortoise-shell being the most beautifully variegated and high-priced in the world. Sometimes the water surface for an acre in extent may be seen disturbed by a violent commotion of terrified and struggling fish when pursued by some larger enemies. Hundreds of sea-gulls add to the confusion, darting down on the water and catching the fish in midair.

A DELIGHTFUL CLIMATE

The climate is similar to other parts of Cuba, which is supposedly the most delightful of any within the tropics. The maximum and minimum temperatures at Cochinos Bay for nearly two years were 96° and 48°, the nights never being over 80°. The dry season lasts from November to May, and is characterized by nearly continuous sunshiny days. There is a popular misconception of the tropical rainy season as it obtains in Cuba. Rain may fall at any time of the year, even in the dry season, but, on the contrary, the rainy season is often interrupted by long periods of dry weather. The wind comes off the land at night, changing in the forenoon to the "virazon," or sea breeze which increases with the sun's heat, and is succeeded by calm at sunset. Thunder-storms are short and violent and often accompanied by heavy squalls. In June, 1906, more than seven inches of rain fell in a single night; but such excessive precipitation is rare.

Photo by Walter D. Wilcox

A SUNSET ON COCHINOS BAY, CUBA

The afternoon thunder-storms, attended by a sudden fall of fifteen or twenty degrees in temperature, are followed by sunsets of marvelous splendor. The glories of tropical sunsets depend on an arrangement of clouds and an association of colors quite unknown to the temperate regions. The sun is surrounded by a soft and rosy glow, the entire heavens, even to the eastern horizon, is illuminated by pink clouds, and the western sky becomes an inspiring picture, built up of reddish brown and purple colors, warm in tone and typical of the tropics. The effects are kaleidoscopic and marvelous beyond description. Great masses of cumulus clouds, still showing the distant glimmer of lightning, are sometimes thinly veiled by intervening light showers of rain, through which their gorgeous colors are softened and transformed into visions of pearl and opal.

HURRICANES

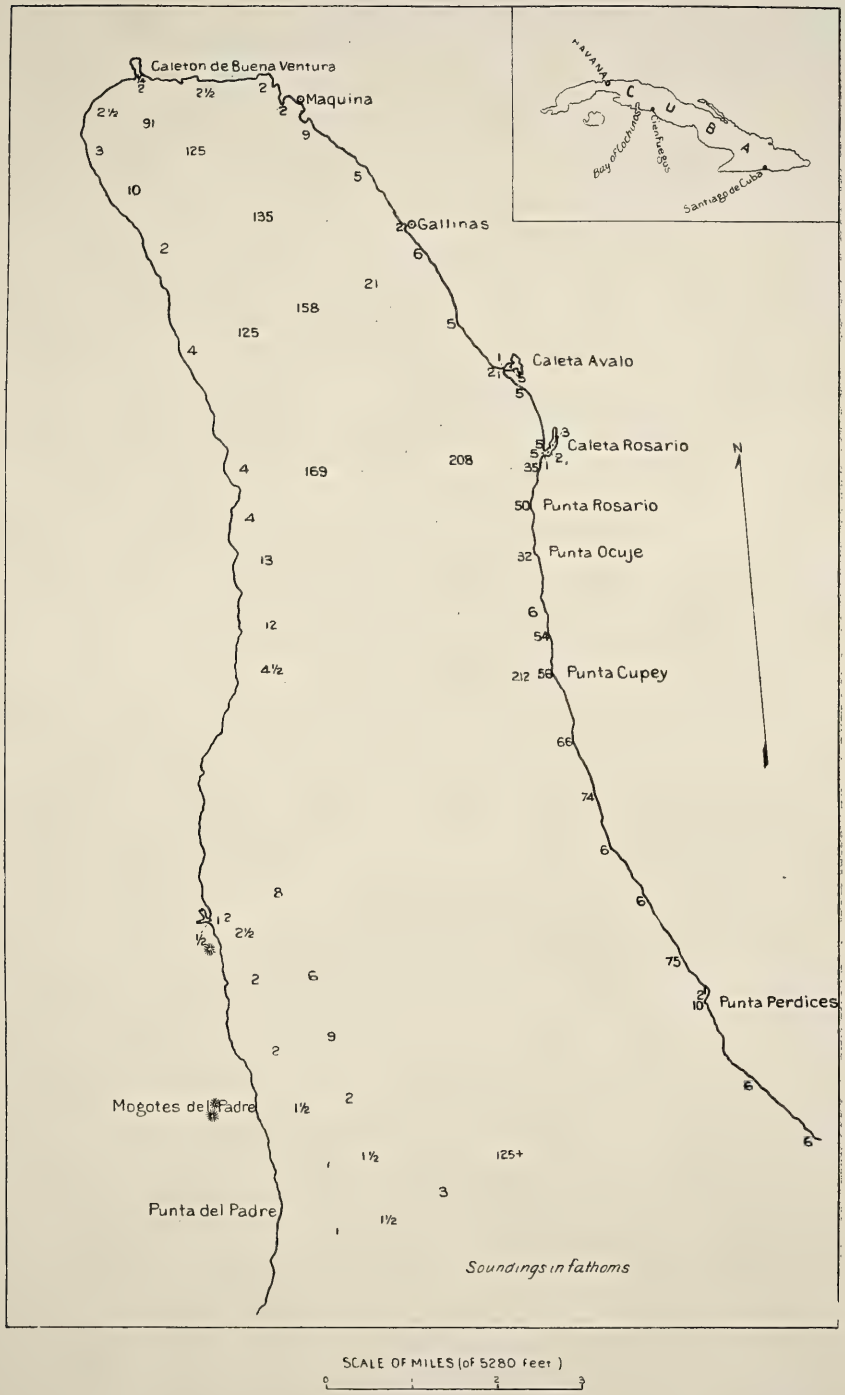
Hurricanes are most frequent in September and October. The last hurricane occurred October 17, 1906, the center passing not far west of the Bay of Cochinos. After a slow fall of the barometer for five days previous, the morning of the 17th was heavily overcast, with the wind southeast and occasional squalls of rain. About sunset the barometer began to fall rapidly and alarmingly. Five or six schooners took shelter within the Caleta, their captains wisely suspecting foul weather. The wind increased in force, till at nine o'clock the crash of broken branches and falling trees could be heard above the roar of surf on the bay, which was a mass of phosphorescent foam in the darkness. The barometer foretold an approaching climax, and though the house was very low and surrounded by forests, it seemed best, about midnight, to put out all lights and seek shelter among some rocks near the Caleta.

Fortunately the rain had ceased, it being a "dry" cyclone, which the natives had told us were the most severe, and the only danger was from flying branches and falling trees. Meanwhile the gusts came in ever-increasing fury, the forest roared in a subdued monotone and the trees were dancing wildly, waving their branches like angry demons in the fury of the gale. About one o'clock the barometer suddenly began to rise, a few stars appeared amid wisps of flying scud, and we knew that the center of the storm had passed, but nearly a hundred trees were uprooted around my house. This hurricane did the most damage in Havana and at Batabano, where it drove sixty schooners and steamers on shore. Such severe cyclonic disturbances are less frequent in Cuba than in other islands of the West Indies and are only expected once in five or six years.

Generally speaking, navigation is quite safe on this coast, though the forty miles between the bay and Cienfuegos is an unprotected shore, against which the heavy surges of the Caribbean thunder terribly in southerly gales. Westward toward Batabano and the Isle of Pines the presence of innumerable islands gives ample protection at all times.

Such in general are the more important features of the Bay of Cochinos. From five to ten schooners arrive and depart every week, engaged in the transportation of timber products and charcoal. The future depends entirely on railroad connection with the interior. Less than twenty miles separates the bay from railroads already constructed, and if this intervening stretch, which is only partly swamp land, can be traversed, the prospects for a considerable commerce is assured for Cochinos Bay. These swamps could probably be drained by a canal 3 miles long, 6 feet deep, and 180 feet wide. Cheaper freight and better docking facilities than in the shallow waters of Cienfuegos harbor would induce large shipments of sugar from the southern parts of Matanzas province. If, in addition, a canal to drain the swamps is constructed, a vast extent of fertile land will be uncovered and the rapid growth of a port is assured.

Notwithstanding the general flat and swampy nature of the region to the west



MAP OF BAY OF COCHINAS FROM SURVEYS BY WALTER D. WILCOX, 1907–1908

and north of Cochinos Bay, this district is remarkably healthful. Several Americans have camped out in the heart of the swamps, drinking the water unboiled for considerable periods of time, without a single recorded case of fever. The swamps are not stagnant, being fed by springs and drained by innumerable underground streams. Much of the land, aside from its great timber value, when finally cleared will be found adaptable to the culture of tobacco and other products, especially the several varieties of citrus fruits.

NOTES AND SCENES FROM KOREA

SOME interesting information has recently been sent to this country by American Consul General Thomas Sammons, of Seoul, about what the Japanese are doing in a practical way for Korea.

A model farm and agricultural college was started by the Japanese at Suwon, 25 miles from the capital of the country, and has just been transferred to the Korean government. The buildings are commodious and well built and equipped with physical and chemical laboratories of most modern description. Large dormitories were erected for the Korean students, but the consul reports that these dormitories had to be heated in the Korean manner, beneath the floors, before any students would attend. Experiments such as are carried on at our best American agricultural stations will be conducted.

A missionary's water-carrier in Pyengyang, Korea. There are no wells in Pyengyang City, as old Koreans said the city was a boat and would sink if wells were dug. So all water is carried by water-carriers from one of the rivers on either side. Photo by J. Z. Moore.

In the nine months during which the station has been in operation it has experimented with sugar-beet, rice, cotton, barley, silk worms, mulberry trees, farm animals, rye, and wheat, besides serving as a meteorological station. It is thought that the experiments with cotton and silk-worms will open up a great future for the Korean farmers. It will take, however, many years before Korean silk becomes perfect, as the Korean mulberry leaf, the trees being large and uncultivated, gives a yellow color and crude appearance to the silk. However, as the mulberry tree was first introduced into Japan from Korea, and as many Japanese state that they can recall when Japanese silk was as crude as is the Korean product, they are hopeful for the industry. The experimenters find that tobacco grows better in Korea than in Japan, but the leaf does not come up to the high American standard.

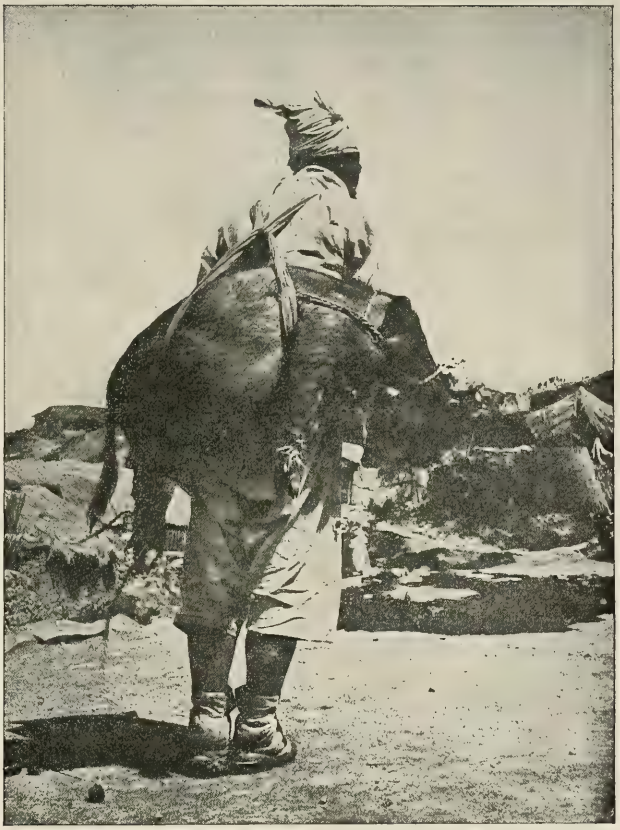
The Japanese authorities have also passed new Korean forest laws similar to those of Japan. In many parts of the country there are splendid forests, but in

other sections the woods have been entirely cut away. In these sections, it is claimed, Korea suffers from disastrous floods as terrible in their ravages as those in China. Coal mines are being hunted for and opened as rapidly as possible, which will also help preserve the forests.

It is not generally known that Japanese forests have been managed longer than any of those in Europe. They were controlled before the birth of Christ, and during the early Christian centuries forest planting on watersheds to prevent floods was enforced by frequent edicts, and the felling of trees was supervised by officers of the provinces. As a result, Japan alone among the nations began modern industrial progress with its forests not only unimpaired but improved after centuries of use. About 59 per cent of its total area is in forests of which the state owns considerably more than one half.

China, on the contrary, has persistently destroyed her forests, with the result that its hills have been largely stripped clean of vegetation and the soil is almost completely at the mercy of the floods. In the lower mountains of northeastern China, where the stripping process has reached its extreme phase, there is no trace of anything worthy of the name of forest. In the graveyards and courts of the temples a few aged cedars have been preserved by the force of public opinion, and poplars and fruit trees planted about dwellings are protected as private property by the peasant owners.

In the province of Shantung, where deforestation is practically complete, fuel and fodder for cattle are literally scratched from the hillsides by boys who go out from villages with their iron rakes in autumn to secure winter supplies. Grazing animals, searching every ledge and crevice, crop the remaining grass down to the very roots.



Most of the carrying in Korea is done by men. Often 300 and 350 pounds are thus borne. Mr E. D. Follwell, who sent this photograph, writes: "I have seen men, and once a woman, carrying two pigs at a time on the back as they went to market."

In western China, where forest destruction is not yet complete, enough vegetation covers the mountains to retard the run-off of the rains and return sufficient moisture to lower levels, where it can be reached by the roots of crops.

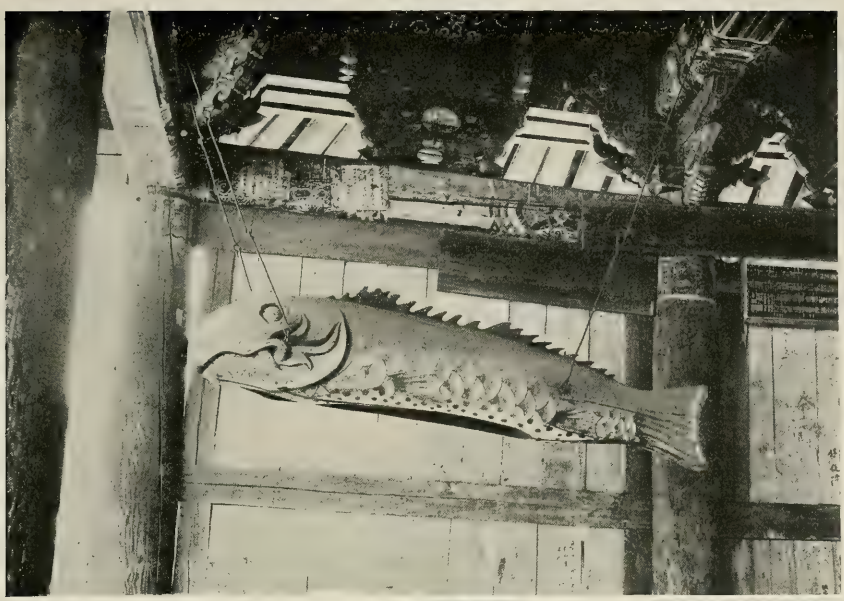
Mr Sammons says that the Koreans have been greatly impressed by the American electrical machines, and that they are adopting all kinds of modern electrical appliances, such as fans and motors and electrical fixtures.

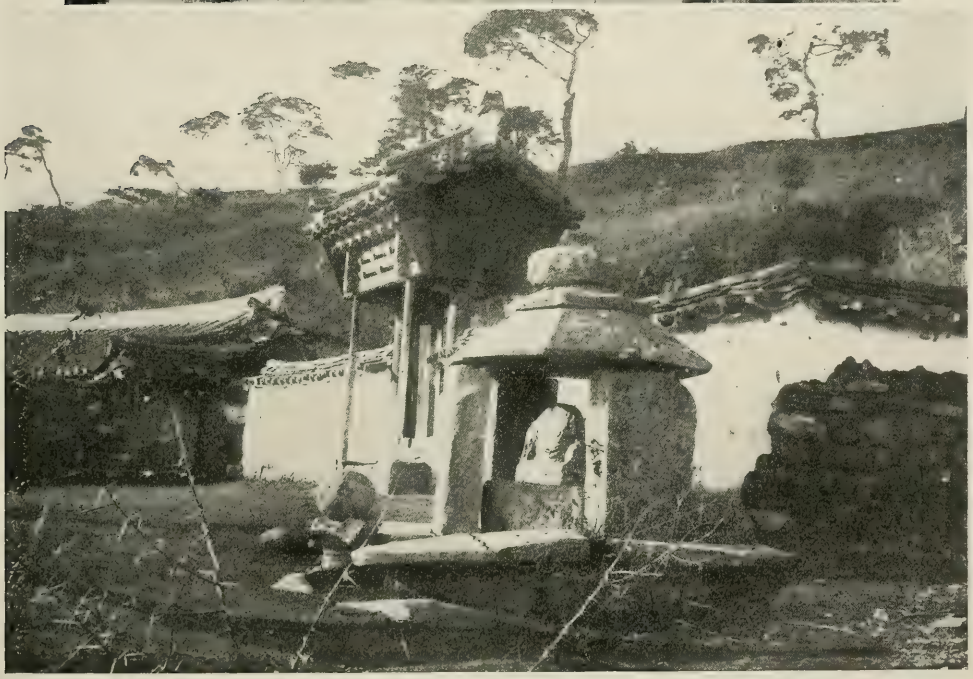
A WAYSIDE SHRINE JUST INSIDE THE SEVEN STAR GATE, PYENGYANG, KOREA

These shrines are becoming fewer each year. Photo from J. Z. Moore

A KOREAN BRIDE IN CHAIR

The bridegroom, dressed in black, stands at the right; on the left stands the go-between, in white. Photo from Bishop M. C. Harris





BUDDHIST FISH INSIDE MONASTERY AT HYANG SAN, NORTH KOREA

Sacrifice is made to this wooden image to protect the spirits of the departed who died from drowning. Photo from E. D. Follwell

A WISHING STONE

The stone, inside of which is the image of a child with the head off, is turned around by those women who want sons, and is also turned around many times that long life may be given to sons already born. At a temple just at north end of Pyengyang, Korea. Photo from J. Z. Mocre.

A KOREAN LADY OF THE COURT

Photos by Bishop M. C. Harris

A KOREAN YOUNG WOMAN

KOREAN FATHER AND TWO CHILDREN

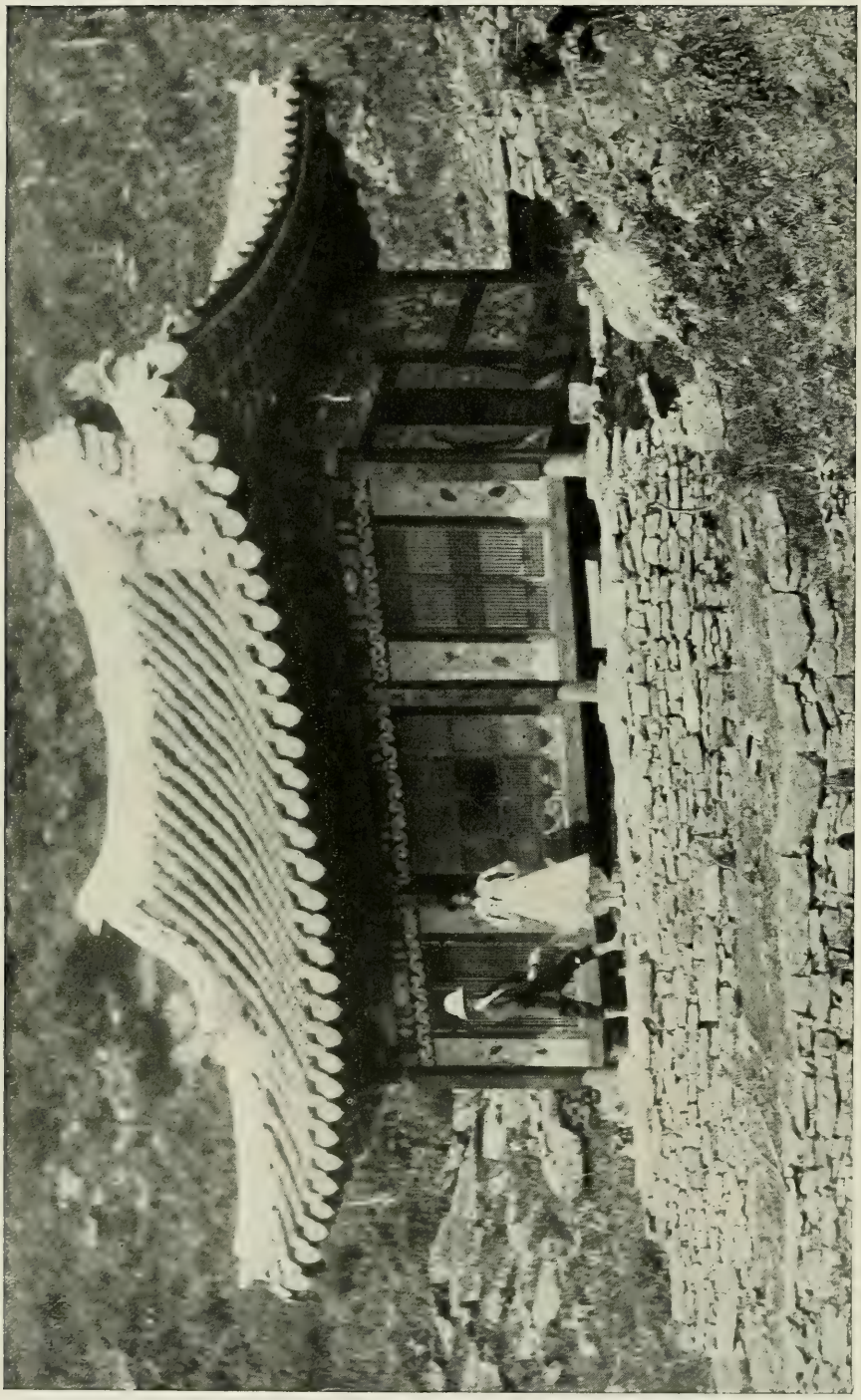
Prince Yi, cousin to the ex-emperor who abdicated in 1907. Photo from Bishop M. C. Harris

Photo from Bishop M. C. Harris

STONE CARVING SYMBOLIZING LONG LIFE: SEOUL, KOREA

BOYS OF HEATHEN SCHOOL, KOREA

They use sand boxes in place of slates. In the study of Chinese characters, they make the character in the sand with a stick, then shuffle box and make another character. Photo by David E. Hahn.



DEVIL HOUSE NEAR THE ENTRANCE TO YENG BYEN, KOREA

Photo by D. E. Hahn

INTERIOR OF DEVIL HOUSE

Scattered here and there through the northern part of Korea, are these little Devil Houses, erected for hathen worship The picture represents the spirits who rule over the destiny of the population of Yeng Byen City. The bags of corn and beans are offerings brought by devotees. Photo from E. E. Follwell.

PART OF THE GALLERY OF NAMES ON TOP OF YAK SAN (MOUNTAIN), YENG BYEN, KOREA

For ages people have come from long distances to have their names cut into these rocks. The scenery from the top of this mountain is very beautiful. Photo by Chas. E. Morris

SOME HUMAN HABITATIONS

By Collier Cobb

Professor of Geology in the University of North Carolina

A CHICAGO reviewer of my article on the work of wind along the North Carolina coast* pointed out that the traveler need not now go to Holland to see windmills, or to China to see wind-driven carts, or to Turkestan to see sand-buried cities. It is equally true that he may review the records of the past and examine into the arts of a remote antiquity without leaving his own land, without departing from his own coasts, if he is so fortunate as to be a dweller in the United States.

He need not go to Switzerland and study lake dredging to find how human habitations were once built upon piles by a race of dwarfs who wished to protect themselves from the dangers of the land and lazily gain a livelihood by fishing from their very doors. Nor need he seek the submerged remains of such dwellings in the lakes of Sweden, Italy, and Ireland.

Neither is it necessary for him to look to far-away Australia in the very recent past for the home of the bushman, which is hardly more than a nest in a hollow under a bush; nor to Central Africa for a half-concealed hut, such as a Batwa pygmy builds for himself of palm leaves. A journey of one thousand miles up the Nile from Khartum is not necessary in order to find the hemispherical hut made or straw-thatch or of carefully woven rushes, that home of so many of the savage descendants of primeval man; nor need the traveler visit tropical Asia, or the Malay peninsula, or the East Indies to accomplish this purpose. The highest type of straw-thatched gabled house, such as is used by the Kaffirs of Natal, may be found far short of the East Coast of Africa; nor is it necessary to visit our new possessions in the Pacific to find such a biding place for man.

Our American Indian still makes for himself a tepee from blankets of his own weaving, and the American of the Far North is sheltered through the long day by a somewhat similar tent covered with the skins of animals, though he burrows in the ground through the long winter night. These American tepees are not unlike the tent of camel's-hair or goat's-hair cloth that protects the Arab from the heat of the desert.

The Gaddanes of Luzon dwell in straw houses built in tree tops, and even the dwellers of King's Island spend their summers in cliff houses perched high upon poles. But the traveler needs not to visit our island wards, the aborigines of the West, or the Esquimaux and Aleuts of Alaska to find even these primitive dwellings.

All of these early types of human habitations may be seen strewn along our own coast from Cape Hatteras to Cape Sable, though they are of more common occurrence along the North Carolina coast than elsewhere. These are by no means the homes of half-savage men, but are the temporary abodes of modern civilized men, native to our own shores, when they engage in the half-savage occupations of fishing and hunting.

They are thus not survivals, but atavisms. Modern man finds himself in a situation practically identical with that of his savage ancestors, and he meets the conditions of existence in essentially the same way as the savage. Man, after all, is largely a creature of instinct, and the small boy of our day is not alone in his instinct of savagery. All of us like to return at some season of each year to the habit and garb of our primitive ancestors. With many of our dwellers by the

* Published in the National Geographic Magazine June, 1906.

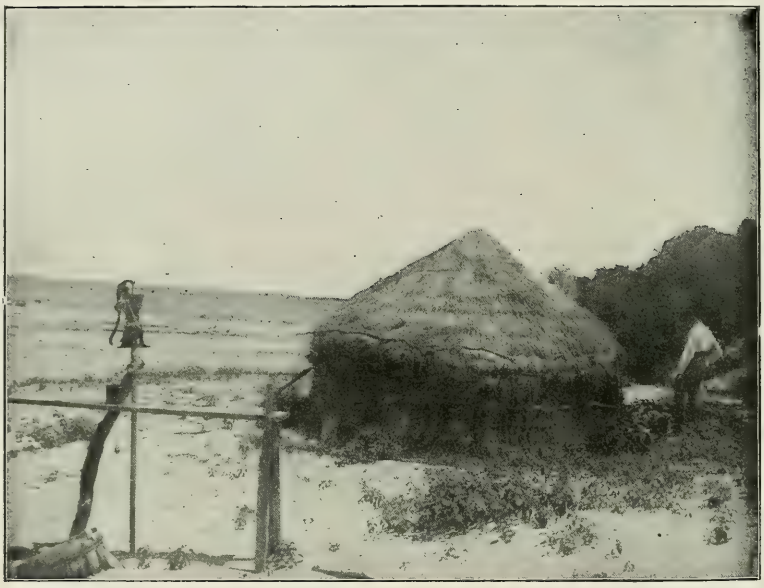


Photo by Collier Cobb

FISHERMAN'S KITCHEN: SHACKELFORD ISLAND, NORTH CAROLINA

sea this occasional has become the usual, and temporary habitations have become permanent, being kept in repair and used from season to season when hunting or fishing.

Our modern savage-from-choice has also the strong instinct for concealment, that characterized his savage forebears, as is shown by the fact that many men who dwell near the coast know nothing of these lodges. For example, I have visited hemispherical huts of woven rushes on Cedar Island, Core Bank, Shackleford Bank, near Tar Landing, less than a mile from Fort Macon, at the Rice Path, about the middle of Bogue Banks, and at the Carrott Island fishery, about four miles from Beaufort. On Cedar Island there is a large kraal with domed and conical huts of woven rush and with gabled thatches. Yet well-informed citizens of Beaufort and Morehead City know little or nothing of them.

In 1902 I took a boat-load of forty-two friends from Morehead City to the Shackleford lodge, not one of whom had ever seen or heard of such dwellings on the North American continent, though most of them had been regular attendants upon the sessions of the North Carolina Teachers' Assembly, at Morehead City, for a number of years. I cannot remember when this hut was built, but it has been in constant use for more than a score of years. It is not distinctly hemispherical, but is round at the bottom, with vertical walls, and its roof is rather conical than hemispherical. It is twelve feet in diameter and six feet in height. It has a door large enough to crawl through and a fireplace in the center, the smoke escaping by a hole in the apex of the roof. The rushes have been so thoroughly soaked in salt water as to be practically fire-proof.

Another case in point: A number of years ago I was wrecked on the Florida coast, and came upon a little key which had upon it one of these primitive habitations of palmetto thatch. I lost my camera in the wreck and consequently could not photograph it; but my kind host assured me that there were many such hid away in the thickets of the mainland

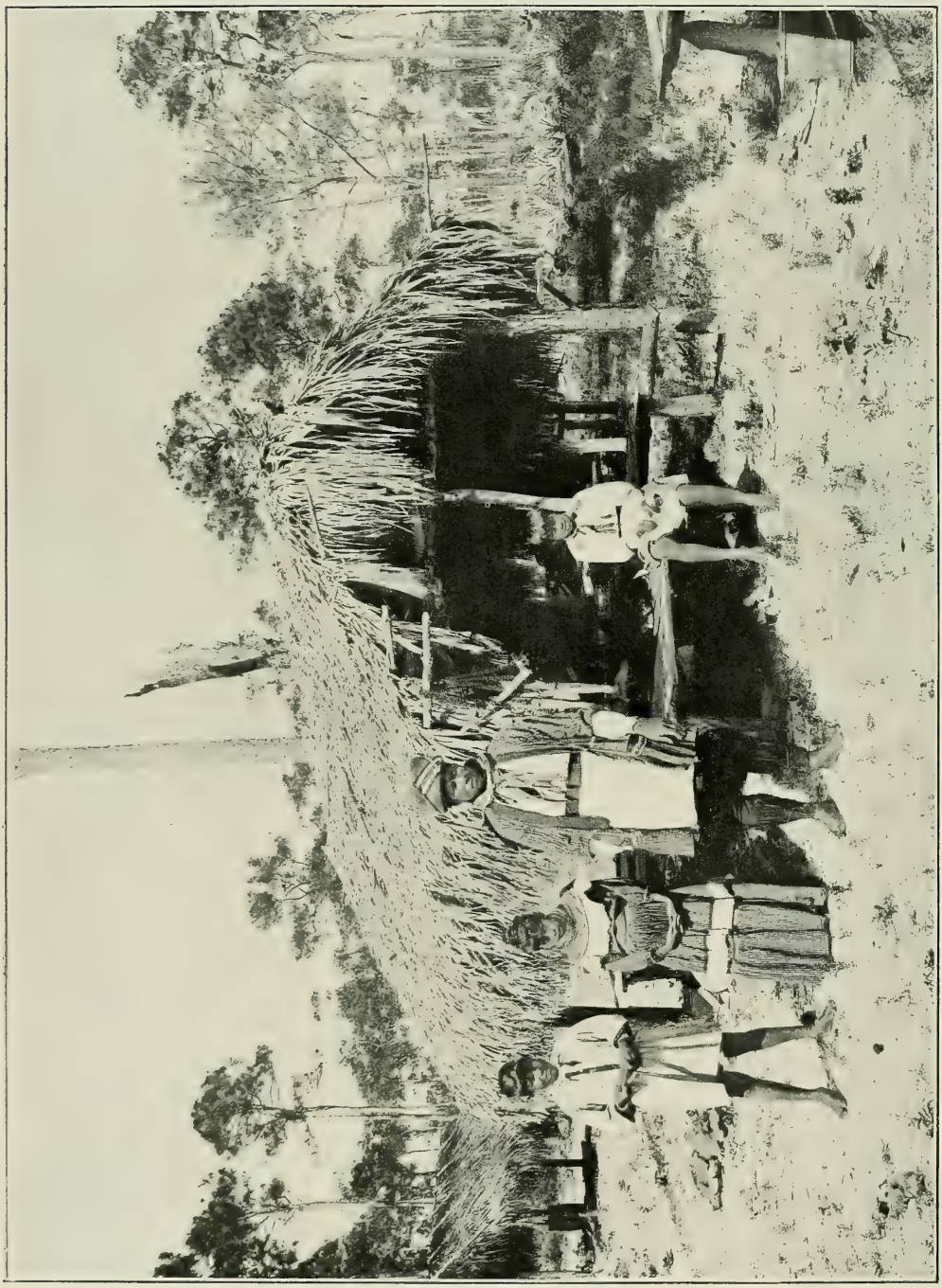
Photo from North Carolina Geological Survey

FISHERMAN'S CAMP: SHACKELFORD BANK, NORTH CAROLINA

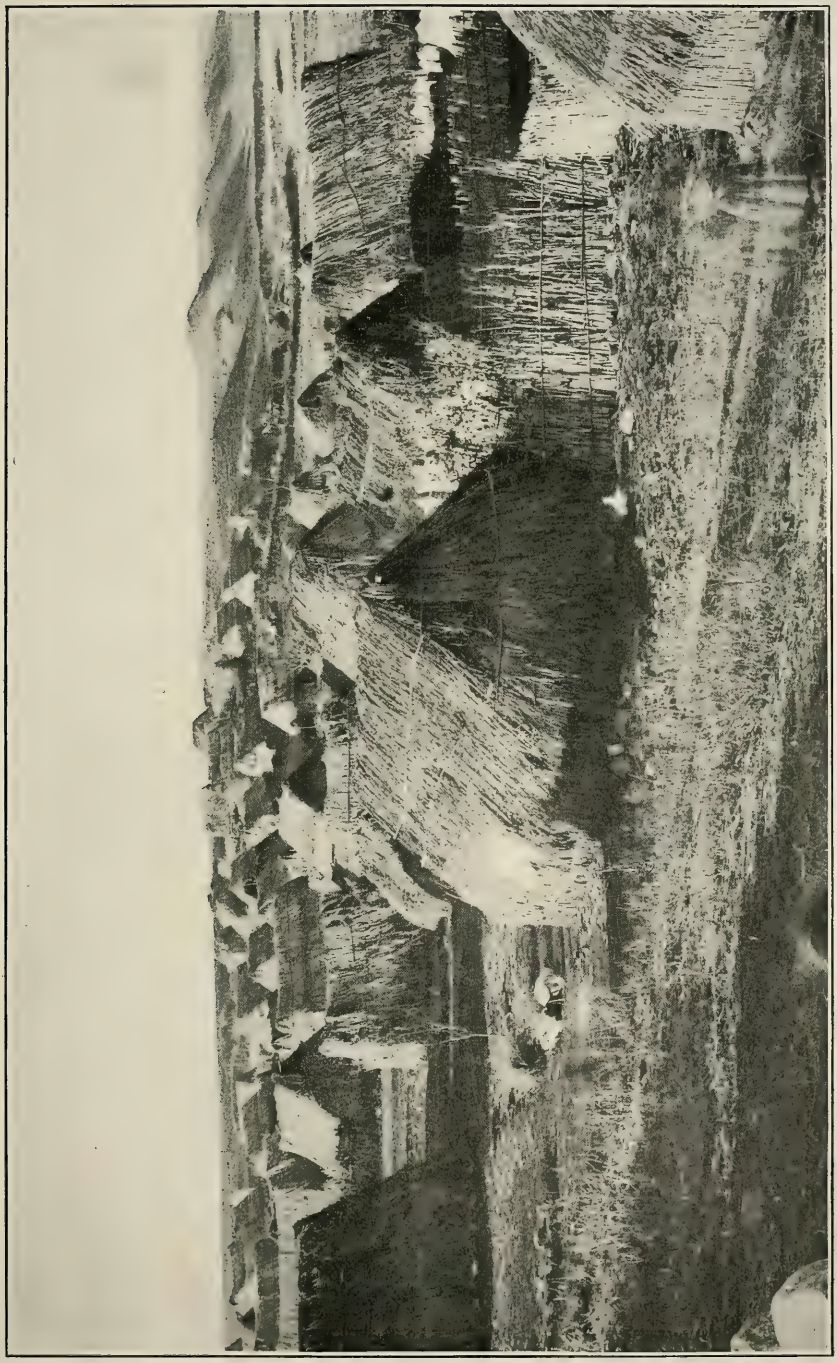
and upon the keys around Biscayne Bay, and that, so far as he knew, they were found all along the keys and the shoreline as far as Key West. Yet letters to several observant gentlemen, thoroughly acquainted with the coast, failed to get for me any information or photographs of such lodges, all of them assuring me that no such exist on the Florida coast. Yet another trial has brought me the desired photograph, the promise of several more, and the assurance that I may soon obtain still more, as the land south of Cocoanut Grove is being taken up by homesteaders.

The lodge in the tree-top, which was unknown except along the North Carolina coast, has largely disappeared with the disapperance of the great forests along "The Banks," as these sand-reefs are called. One of the earliest, and the first to disappear, was that at the Kill Devil Hills, which was used by the early settlers of the Albemarle district as a watch-tower when on the lookout for New England ships that brought Medford rum to the Carolinians in exchange for corn. Another was at Nag's Head, where the rude wrecker of Colonial days found it to his advantage to keep informed as to the movements of these same New England ships on their way to the West Indies for molasses and more rum. No old inhabitant of Hatteras has any recollection, or even tradition, of such a lookout there; but Blackbeard's piratical crew maintained a tree-top lodge in the great oaks near Teach's Hole, on the southwest end of Ocracoke Island. These all disappeared long before the days of our oldest inhabitant.

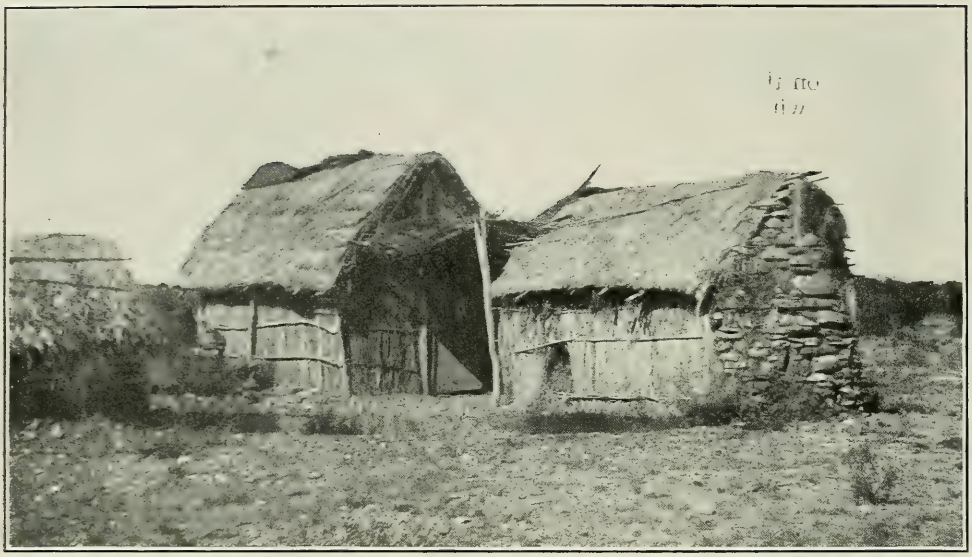
Southward from Ocracoke Inlet, such lookouts, as they were here called, have been known during the past half-century on Portsmouth Island, on Core Bank, near Cape Lookout, and near the western extremity of Bogue Banks, where they were maintained from early Colonial days



SEMINOLE INDIAN HOME NEAR MIAMI, FLORIDA



HARVEST HOMES AT GABII



GOAT HERDER'S HOUSE IN TEXAS

down to the disappearance of the forests, from forty to fifty years ago. I well recall a rush-built lodge on Bogue Banks, long used as a lookout for whales, which, its hoary occupant told me, had replaced a tall tree-top lookout of considerable dimensions.

While the great tree-top habitations have practically disappeared from the tall trees there, lookouts of less significance may still be seen where the tall pines come down to the water's edge along the western border of Currituck Sound, and I recall one such at Kitty Hawk. Within five years I have also seen them on Jew's Quarter Island, Bell Island, Church's Island, Colleton Island, and at several points on the Currituck marshes.

Straw-thatched lodges are also frequently built along this same western border, when trees do not afford the necessary height. They are no longer used by pirates and wreckers watching for their prey, nor by whalemen seeking big game in the sea. The laws permit hunting in the sound on only four days in the week, and these lesser tree dwellings are occupied by old hunters on Wednesdays and Saturdays, for here they may watch the passage of wild fowl.

It is in this region, too, that the hunter who expects to be away from home for a few nights only makes his nest of rushes under a bush and possibly throws around him an additional bush or two, or, perhaps, a few leaves from the fan palmetto, so abundant on Colleton Island. If he expects to spend some time in the neighborhood, he makes a low rude frame with bushes, covering it with brush or with palmetto leaves, after the manner of the pygmies.

It is also in Currituck Sound that the lake dwellings are encountered. These are not for temporary occupation, but are the permanent homes of their builders, who occupy them with their families all the year round. They are built on piles in the sound, which is now a living lake, as the entering streams have leached out the salt since the closing of the inlets that afforded communication with the sea. One such house I mentioned in my previous article as having been moved before an advancing sandwave and finally built on piles in the sound; but there are many others built originally as lake dwellings.

I recall one where the family occupied the top floor, the proprietor conducting a general store on the level of the bridge connecting him with the mainland, and carrying on an extensive business in the purchase and shipment of fish and game at the water-level underneath.

While somewhat similar lodges were found by the Raleigh voyagers to our shores in 1585, as is shown by John White's water-color drawings in the Grenville Collection in the British Museum, the circumstances seem to warrant the belief that these are atavisms rather than survivals. It is not so, however, in the case of the palmetto shacks of the Florida coast, which are clearly imitations of the homes of the Seminole Indians in their immediate proximity. These Indian lodges are furnished with a floor raised just high enough above the ground to admit the ever-present hog with his community of fleas. The lodge is rarely occupied except at night, and the platform is in reality a bed rather than a floor. The driven rain is usually kept out by mats and blankets hung around the walls.

Thus we see that men, however far removed from one another in time and space, instinctively meet similar conditions in essentially the same way. The shepherds who occupied the Palatine Hill in 753 B. C. built very much as the North Carolina Islanders do today; and Italian peasants of the present time build in the Pontine marshes or in the Agro Romano, when they come down from the mountains for the cultivation of their maize fields, houses essentially like those of the days of Romulus and Remus.

The prototype of these prehistoric contemporary settlements is the village constructed every autumn on the now drained lake of Gabii, at the twelfth milestone on the Via Praenestina, and inhabited by a half-savage tribe of two hundred mountaineers. The natives of New Guinea, the huntsmen of Borneo, and the fishermen on the Volga construct huts of essentially the same type.

IS OUR NOBLEST VOLCANO AWAKENING TO NEW LIFE

A Description of the Glaciers and Evidences of Volcanic Activity of Mount Hood

By A. H. Sylvester

United States Geological Survey

THE early immigrant to Oregon, while yet on the eastern sagebrush plains, if the day was clear, saw a great white mountain, like a specter, beckoning him ever westward. The sailors of an English exploring ship beheld, day after day, from the Pacific Ocean, the same great mountain, standing white and alone, high above the forest-clad hills that stretched to north and south. They gave to it the name of an admiral of their navy, and never has a man's memory been perpetuated by grander and more beautiful monument.

The Indians of Oregon venerated the great mountain and worshipped the spirit that dwelt therein. The immigrants soon gave to it a love as strong as the native's veneration; and justly, for over every one who comes within its dominion it casts the spell of its enchantment.

Having seen Mount Hood at various distances and from various directions, for

Copyright by Kiser Photo Co., Portland Oregon

MOUNT HOOD FROM SANDY RIVER BLUFFS: LOOKING EAST UP SANDY RIVER

twelve years, and having come under its spell, it was with pleasure that I received my orders from the U. S. Geological Survey, in the spring of 1907, to begin the mapping of the Mount Hood Special Quadrangle.

The latitude of the mountain is 45° 22′ 26″.74; its longitude, 121° 41′ 42″.81 west of Greenwich. It lies on the crest of the Cascade Range, about 20 miles south of the Columbia River and 50 miles east of the city of Portland. It is the highest point in the State of Oregon, rising to a height of 11,225 feet. This elevation was determined by Col. R. S. Williamson, U. S. Army engineers, at an early date, and was checked by me last summer.

Timber grows on and about the mountain up to an elevation of 6,500 feet. The highest trees are stunted hemlock and dwarf pines, which venture out from the denser forest along the straggling lines of the old moraines.

The waters of Mount Hood reach the Columbia mainly through the Hood and Sandy rivers and their tributaries. Hood River drains the northern and eastern sides; the Sandy, the southern and western. White River, which receives the drainage from one glacier on the south side, is a tributary of the Deschutes, which reaches the Columbia above the Dalles. At low water the flow of these streams, according to the measurements of the Hydrographic Branch of the Survey, amounts to about 750 second-feet—enough water to cover in a year the District of Columbia about 160 feet deep!

AN ALMOST PERFECT VOLCANIC CONE

Mount Hood is one of the great volcanic cones built upon the Cascade peneplain in Miocene times. It is the fourth in height of the snow peaks of the Pacific Northwest, being surpassed only by Rainier, Shasta, and Adams. The peneplain-like plateau upon which it stands is now well dissected, but the numerous remnants show a fairly uniform elevation of from 4,000 to 4,500 feet. The mountain rises, therefore, about 7,000 feet above the surrounding country. It was probably never much higher than at present.

Though showing many of the features of the volcanic cones of the region, it has enough peculiar to itself to give it a marked individuality. With the exceptions of Saint Helens, in Washington, and Pitt, in southern Oregon, its cone is more nearly perfect than the others. It appears to have been built up entirely of andesitic lavas which were ejected from a single summit crater. Unlike Adams, it has no subsiding craters or smaller blow holes on it or about its base—at least none of recent age. Barrett Spur, Langille Crags, or Coopers Spur may have been such craters; but, if so, they are very old and have weathered to such a degree that they no longer have a crater-like appearance.

The volcano apparently became extinct before reaching the stage of the ejectment of the more basic basalts which Shasta and Adams poured out in comparatively recent times. In this connection, however, it might be well to state that there is, some ten miles to the northeast, a large lava flow, probably from fissure, that from a distance appears recent. It was not visited, but could be seen fairly well with field glasses, and at the distance resembled lava flows that lie on the north and south sides of Mount Adams and could probably be correlated in time with them. Neither timber nor grass has as yet begun to grow upon it.

The rock of which the mountain is built is greatly seamed and fissured. Water penetrates it easily, therefore, and, freezing, shatters great masses. On the lower slopes one sees all stages of such disintegration. There are boulders as large as a house shivered into a thousand pieces by frost. Some of them retain their original shapes, others are falling down, and yet others are but a pile of earth.

GOUGING BY GLACIERS

In the work of tearing down the mountain, ice has indeed played the star part. While the freezing of water into the joints has fractured the rock, the glaciers

have done the greater work in not only carrying away the debris that falls from the cliffs, but in gouging out canyons and cutting back into the bowels of the mountain itself. The amount of cutting going on at present is not inconsiderable, and from it one gets an idea of what it must have been during the periods of infinitely greater glaciation.

The wide U-shaped valleys of the Sandy and the Zigzag rivers are plainly glacier-sculptured. The intense forestation has covered up and the heavy rainfall has washed away much of the evidence, but in the valley floors one sees many large angular boulders which appear to be of drift origin. These were found as far down the Sandy Valley as the right-angle bend below Cherryville, where the river enters a canyon. On the bench north of the junction of the Zigzag and Sandy rivers, called Crutchers Mountain, the bed rock is deeply scored.

The drift in the Sandy Valley above the forks is much fresher in appearance and more clearly glacial than that below. The wagon road up the Zigzag above the Tollgate runs over what is clearly morainal material all the way to Government Camp and beyond. On its way it climbs Laurel Hill, a ridge of old granite rock which shows striæ and polish. Along the top of the ridge north of the Sandy River, between Hood and Last Chance Mountain, stretches the remnants of an old moraine.

In the park area between the White River and the East Fork of Hood River the rocks that are exposed are very hard, and here again were seen beautiful striæ and grooves.

How far this glaciation extended I do not know. I found no trace of it west of Cherryville, but at that place begin to appear what I take to be the terraces of the Willamette Sea of Pleistocene times, and the plot becomes too complicated for the novice.

Permit me to call attention, however, to the great cirques at the heads of the various branches of the Bull Run River and their comparatively low elevation. A closer study of the map reveals lesser cirques in many places. The ice undoubtedly swept through the low passes in the main divide at the head of Clear Fork and Bull Run Lake; also through Lost Lake down the Lake Branch.

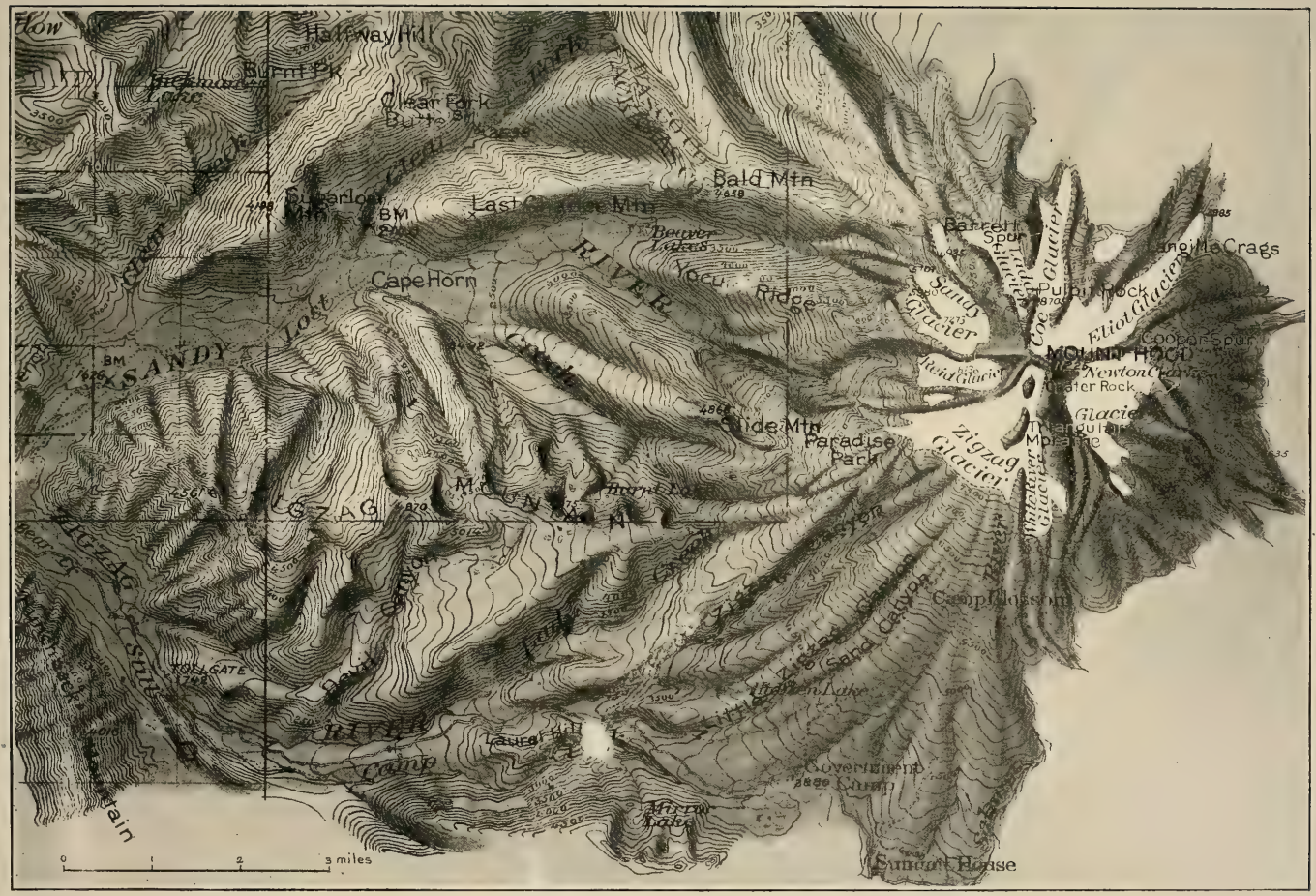
These two lakes themselves offer much of interest to the geologist. The former was made possible by a fissure flow of lava in the bottom of the canyon, where now is the lower end of the lake, forming a dam behind which the water collected. This lava is unglaciated and is therefore more recent than the great glacier that carved out the canyon. The lake outlets through the lava, not over it. The lake level varies during the year as much as ten feet.

A DROWNED FOREST

Lost Lake, on the contrary, does not vary over a foot at most. It has a fair-sized outlet into Lake Branch. *One sees, when navigating it, tree-tops far below its surface.* In other words, here is a forest that has been drowned. Lost Lake Butte is an extinct volcano. A flow of lava from it has probably dammed the lake's outlet to the east, causing the basin thus made to fill and overflow to the north. Lost Lake when discovered contained trout, though it is now impossible for fish to come up Lake Branch into it because of falls. Bull Run Lake has no fish naturally, but white fish have been introduced. The isolated ridge north of Lost Lake is largely made up of a cinder deposit in which volcanic bombs of various sizes occur.

ENORMOUS MASSES OF DEBRIS

But, to return to our mountain, one of its most prominent features is the fan-like outwash on the southwest side. By glancing at the map you will see that this radiates from the gap in the crater's rim and probably bears a distinct relation to it. This whole side of the mountain, reaching from the ridge east of the White River Canyon to that between the forks of the Sandy River, is deeply covered with glacial debris. The small canyons at the foot of the White River glacier are trenched in this debris which



RELIEF MAP OF MOUNT HOOD

Based on data compiled by the U. S. Geological Survey

once filled the old canyon completely. The Little and Big Zigzag canyons are cut in it. The Little Zigzag has not reached bottom; the Big Zigzag at its upper forks is in about 30 feet of basalt, but a little farther down stream it is still trenching in the drift. The south fork of the Sandy and Slide Creek are beginning the herculean task of cutting away the drift that nearly fills the old canyon that lay between Slide Mountain and Paradise Park on the south and Yocum Ridge on the north.

To account for this enormous mass of debris, there is this possible explanation: The forces that built the mountain left it with a well-developed summit crater about one-half mile in diameter and 500 to 700 feet deep, with the lip at the southwest side somewhat lower and probably of less resistant rock than that on the north side. When the age of ice came on, this crater became filled with snow and the mountain was covered with an ice-cap such as we now see on Rainier and Adams. Glaciers formed on the sides and gradually worked back until the whole southern rim of the crater was cut away and the materials that made it were spread out on the lower slopes and filled the canyons that had previously been trenched. The glaciers then extended back to the inside of the north rim as they still do. They cut away the floor of the crater, but the harder rock of the old neck resisted and divided them and survives as Crater Rock.

The other sides of the mountain have also been trenched more or less deeply and much debris is spread out below, but nowhere in such quantities as on the southwest.

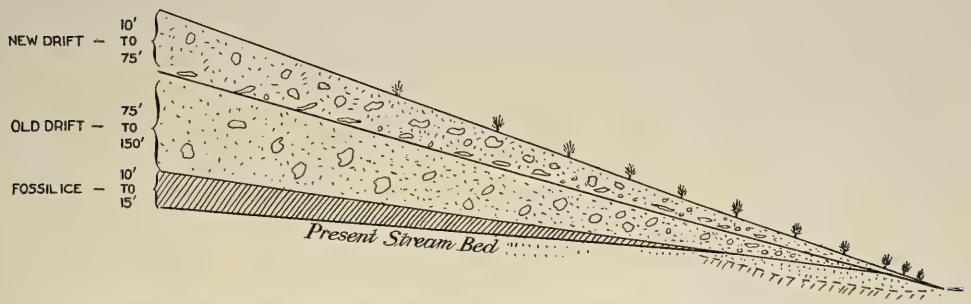
ABUNDANT FOSSIL ICE STILL FOUND

Let us now examine the White River Canyon more in detail. Unfortunately the map has not been extended enough to the south to shed light on the nature of this canyon below its immediate relation to the mountain. There seems, however, but little question that when the ice filled the Zigzag and Sandy valleys a similar glacier extended many miles down the White River. This glacier was deeply covered with debris from the ruined crater. So thick was this debris and so well protected by it was the ice that to this day some of the ice of the ancient glacier remains. In the section exposed by the cutting of the new streams, fossil ice to the depth of 10 to 15 feet may be seen at the bottom of the small ridge which Reid has called Moraine Mesa. The section of Moraine Mesa exposed is shown in the accompanying sketch.

The bottom layer is the fossil ice. This is covered with from 75 to 150 feet of morainal material. Above this is about three feet of black soil, or forest humus, on which rests or is rooted a confused mass of tangled logs, with an occasional stump standing erect. Some of these logs are above two feet in diameter. They are still wood in a good state of preservation, being neither carbonized nor silicified. The top layer is drift again of the same character as the lower layer and is from 10 to 75 feet thick. It indicates, of course, a return of frigid weather conditions and a readvance of the ice after a temperate climate period long enough, at least, to allow for the growth of the overthrown and buried forest.

This second drift sheet extends only from the forks of the smaller canyons at the head of the present valley back to the end of the existing glacier or possibly beneath it. It is too recent for vegetation to have made headway upon it. One or two small pines and a few grasses and bipines are all that it has. A few buried logs were observed on the west side of the mountain, near the end of one of the prongs of the Zigzag Glacier, which indicates a probably similar readvance of the ice on that side.

It is scarcely necessary to speak here of the glaciers as there are today. The map speaks for itself in regard to them. The Survey last year, for the first time in its history, adopted the method of contouring the glaciers, the contour lines on them to be shown in light blue. There



LONGITUDINAL SECTION OF MORAINE MESA, EXPOSED BY NEW STREAM CUTTING

are eight ice fields on the mountain which have been recognized as glaciers and given names.

I have mapped, in addition to these, four smaller fields as glaciers, of which the one between the Ladd and the Sandy is the largest and most interesting. The Sandy reaches the lowest elevation, about 5,700 feet, while the Eliot is the longest, about an even two miles from *bergschrund* to nose.

The three glaciers on the north side of the mountain present a most glorious picture as they cascade down from near the summit in great broken masses. After separating, below their common gathering ground, they assume the character of true alpine glaciers. The Newton Clarke, on the east side, though of great beauty, partakes more of the character of a cliff glacier. With the exception of the Zigzag, which is comparatively smooth, they are all very greatly crevassed and travel over them is difficult. On the whole, they are all probably receding, but owing to several recent hard winters they now appear to be advancing a little, except in the case of the Zigzag and the White River, where another condition intervenes, the volcano's heat.

IS THE ANCIENT VOLCANO AWAKENING?

The volcano has not been in eruption for untold centuries, except as the fissure flow that dams Bull Run Lake and the one that made the lava beds to the northeast be regarded as related to it. Since the mountain was first visited, however, there has been steam escaping from various places on it, but mostly from Crater Rock, together with gas, generally hydrogen sulphide.

Professor Russell, in his book on American Volcanoes, gives a picture taken in 1882 of a so-called fumarole on the south slope of Mount Hood, which was, as near as I can determine, just east of Crater Rock. This picture shows a well-shaped depression in the glacier from which steam was probably escaping. This fumarole apparently became inactive, or later visitors do not mention it.

In the last three years, however, the sleeping volcano has been warming up and stirring in its sleep. Last summer the old fumarole had so devloped that the White River Glacier is now cut in two at this point and its bed between Crater Rock and Steel Cliff, for 150 feet along its course, is exposed. Steam and noxious gases are escaping from fissures in the rock thus laid bare.

On Crater Rock steam escapes from numerous fissures and many places are too hot to hold the hand upon, but the most active place is on the north side of the rock, in a depression which is commonly called the crater. Here a considerable area formerly covered by the Zigzag Glacier has been laid bare.

On the 28th of August, 1907, my main camp was at Government Camp, five miles from the summit of Hood. For several days previous to this I had been with a side camp on the east side of the mountain. From there, during that time, it was noticed that Steel Cliff, the high east wing of the crater, was steaming more than usual. We had been hav-

Photos by N. B. Eckbo, U. S. Forest Service

CLIMBING ZIGZAG GLACIER: GUIDE IN FRONT CUTTING STEPS AT WORK ON THE TOP, 11,225 FEET

ELIOT GLACIER, AT NORTHEAST SIDE OF MOUNT HOOD

Photograph taken at base of summit to show the deep crevasses at the limit of the glacier: Cascade National Forest, Oregon. Photo from U. S. Forest Service

Photo from U. S. Forest Service

ANOTHER VIEW OF ELIOT GLACIER, ON MOUNT HOOD

ing rainy and foggy weather, with the mountain much of the time hidden from view, but the 28th was bright and clear. My cook, Wm. Hinshaw, of Portland, and teamster, O. G. McIntyre, of Salmon, Oregon, were in the main camp. They are men in whose word and common sense I believe reliance may be placed.

They saw a column of smoke, probably dense steam, rising from Crater Rock, high above the sky-line of the summit of the mountain. This persisted throughout the day.

There were probably as many as a dozen other people at Government Camp who also saw the smoke. An unsuccessful attempt was made to photograph it. My own view of that side of the mountain was effectually cut off by Steel Cliff. In the afternoon McIntyre came around to me. He says that when crossing the White River Valley he could look directly up the canyon, in behind Crater Rock, and the smoke appeared much plainer than it had from Government Camp. The stream, White River, as he crossed it that day, was at its usual stage.

MORE EVIDENCE OF VOLCANIC ACTIVITY

That night Hinshaw, from the main camp, saw with field glasses a glow from behind Crater Rock which he described as looking like a chimney burning out.

I returned the next day, the 29th, to Government Camp, crossing on the way th White River, which had swollen over night to an angry stream of treble its volume of the day before. The weather was cold, and though a drizzling rain had begun to fall in the early morning, *there was no warrant for the rise in the stream except the volcanic heat melting the glacier which is its source.* Clouds obscured the mountain for a week following the 28th.

I moved camp on the 30th out of sight of the crater, and during the month that remained of the field season saw no further signs of activity.

Mr S. N. Stoner, formerly of the Survey, on about the 12th of November, which was a very clear day, saw from Portland what he took to be smoke rising from Hood. I have heard of no further disturbance, and his observation at the distance of 50 miles is of course of questionable value.

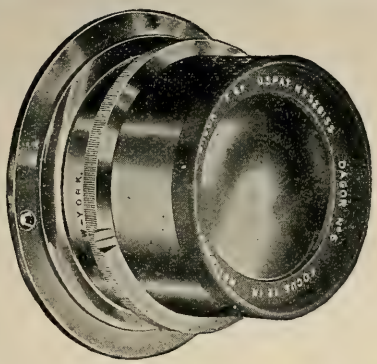
It is interesting to note that this activity of the old volcano was occurring at the same time that daily changes were being observed in the Bogaslof group of volcanic islands off the Alaskan coast.

Whether the phenomena observed last August presage an awakening of the old volcano to new life, or whether they were but a dying gasp, which over, the giant will relapse into a yet deeper and perhaps final sleep, time alone can determine. They do show, however, as Mr J. S. Diller has pointed out, that volcanoes like Pelee or Vesuvius, which are intermittently active, continue to feel throes of life at long intervals, but weaker and weaker with the passing of time, long after they are destructively active.

But for the present Mount Hood must be taken from the list of extinct volcanoes and placed at least among the doubtful.

ESKIMO BEAUTIES FROM GODTHAAB, GREENLAND

There are about 10,000 Eskimos in Greenland, most of them living in settlements along the southwest coast of Greenland, where contact with several hundred Danish settlers and with whalers has civilized many of them to a considerable extent. Photo by Capt. Roald Amundsen.



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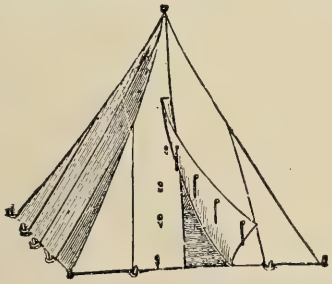

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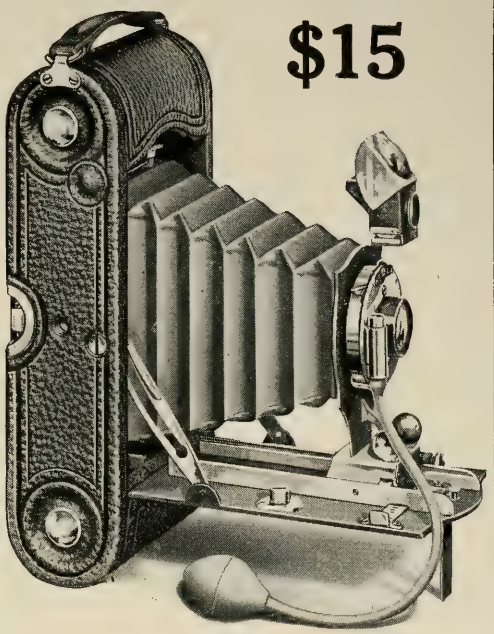

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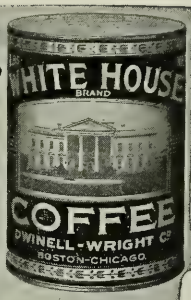

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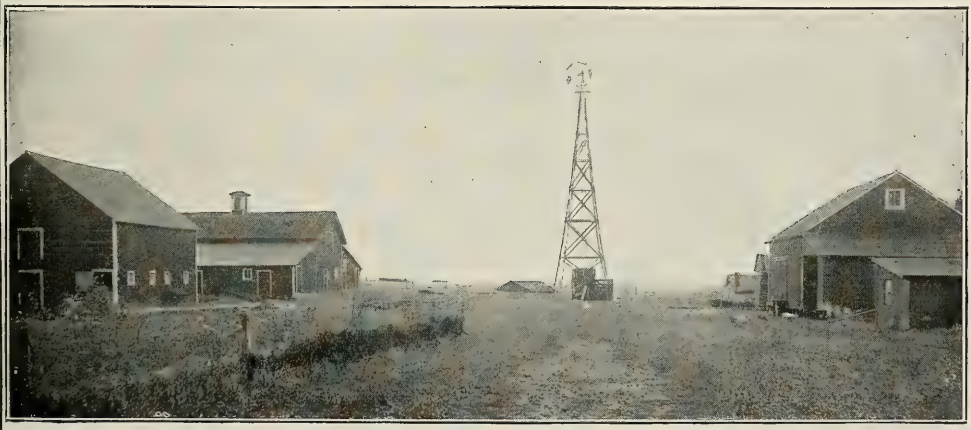

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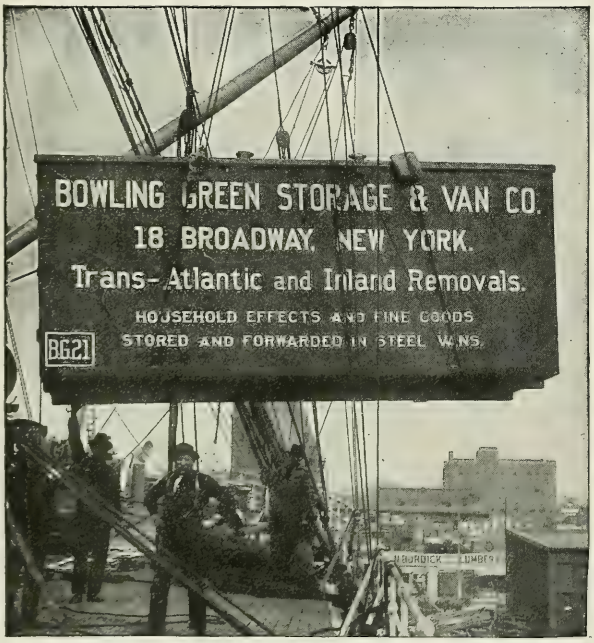
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THE NATIONAL GEOGRAPHIC MAGAZINE

FURTHER NOTES ON DUTCH NEW GUINEA*

BY THOMAS BARBOUR

With photographs by the author

IN the previous number the houses of the Geelvink Bay region were described. It remains now to present notes on the houses of Djamna and the villages in Humboldt Bay.

The houses of the former region are not over the water, but are set back in the woods. They have high-pitched roofs and are built of the midribs of sago-palm leaves. These are set up side by side and are held in place by rattan lashings. The roofs are covered with palm-leaf thatch, as usual. The only means of entrance or exit is a single square hole, often 10 feet from the ground; this is reached by a notched pole, the usual substitute for a ladder, or a large log set up slanting, through which rattan loops pass at various levels. These houses are dark, smoky, and smelly, and as they were peopled by a tribe who were decidedly "put out," or offish, for some reason, while we were with them, though they are usually quite friendly, our notes are not detailed as to their furnishings.

In Humboldt Bay, on the frontier of German New Guinea, we have one of the most interesting and beautiful regions imaginable. The bay runs back from a wide mouth, its sides closing in after we have gone perhaps a mile and a half. In this constricted part the view into the inner bay is almost completely cut off by the little wooded islet of Metu Debi. On the innermost sheet of water, called the Jotefa Bay, are several villages, as there are also on two arms leading from the outer bay.

These little towns are all most picturesque, as the photograph taken of Kajo shows. When it was taken the water looked so blue and the beaches so white, from the top of a hill near the mouth of the bay, that it seemed almost as if it were the glimpse of another world. Way below, near the shore, a rough crowd of Papuans were talking over the steam launch which had carried us in here. In the boat it had been smoky and frightfully hot, while the crowd that waited for us was indeed a noisy one.

Men of all ages shrieked and yelled and hopped up and down in their frantic efforts to give vent to thei- excitement—men as naked as when they were born and who had evidently refrained from bathing for a long time. Many objects interested them, and most naturally. Cameras were a source of deep curiosity, as were butterfly nets and killing bot-

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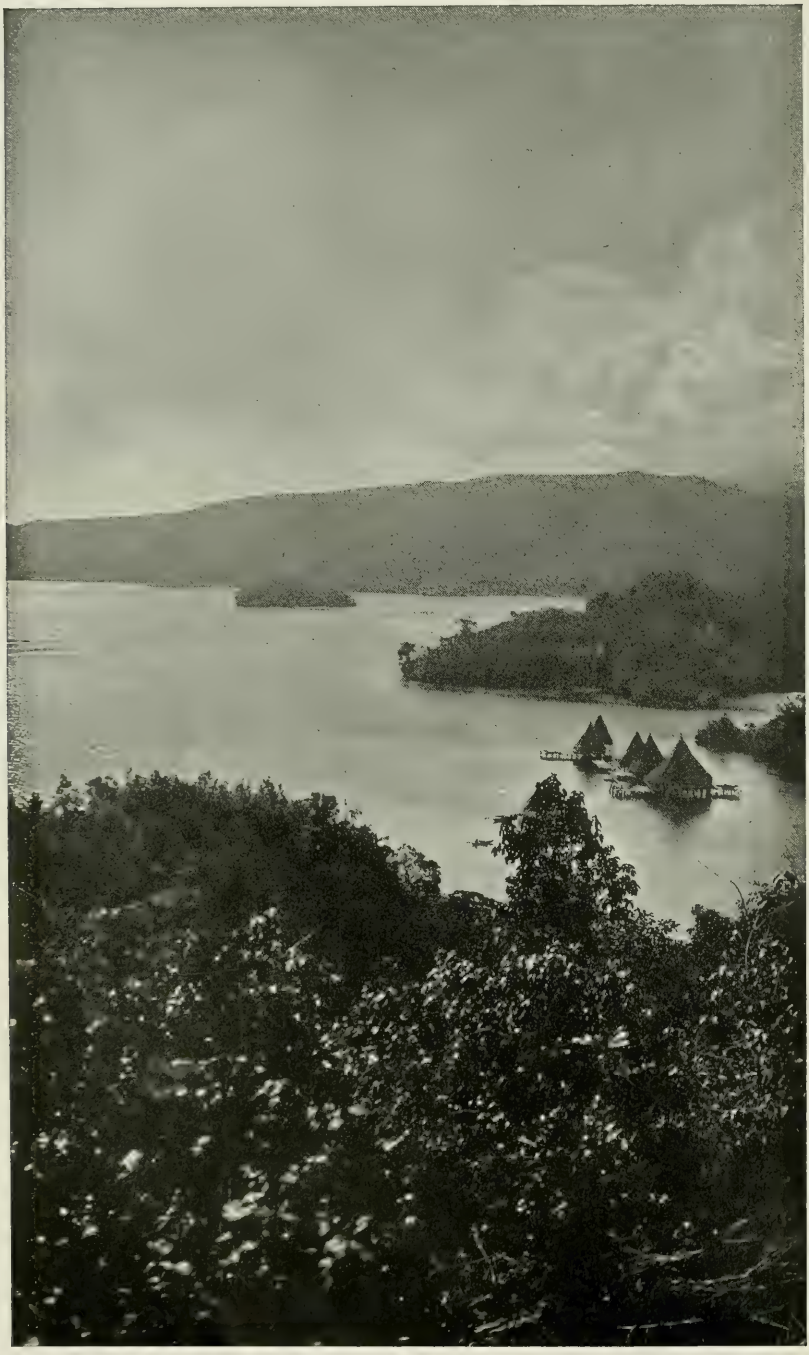


AN EARLY MORNING VIEW OF THE VILLAGE OF KAJO, IN HUMBOLDT BAY

The colors of the water here surpassed anything in the West Indies or the Mediterranean. Some of the hills and distant mountains were heavily wooded; some great stretches were covered with "alang-alang," a tall grass of beautiful pale green. The contrasts of color were almost as beautiful on shore as in the water.

tles; but the most remarkable of all, to these and many others of the people, was their first sight of a white woman. That was indeed the event which will live the longest in the local traditional history.

The villages are set on poles and the houses are arranged to form irregular streets. The various pictures tell better than words how pretty these little groups of curiously shaped dwellings are. All the towns are picturesque, but the palm is held by Tobadi, the largest town in the basin, and one which contains probably as fine an example of what the savage architect can do, when impelled by religious motives, as exists. In speaking of these religious structures I will call them "temples." The word "Karriwarri," which is generally applied to them, probably means the building, but it may mean the spirit which is worshiped in it.

In various localities we had seen the small square houses which serve as sacred buildings in the Geelvink Bay country. These, however, are mostly used as "bachelor houses," where the unmarried men sleep while they are learning the net-making and basket-weaving and other things which every grown Papuan must know. These houses are neither beautiful nor especially interesting.

In Djamna, however, we walk back into the woods and a most astonishing structure stands before us. The general shape of this building is very similar to that of a house such as is regularly built in Djamna, but the ends are wonderfully decorated. Each is composed of hewn boards set up side by side and on each of these is a design running from bottom to top.

The native artistic ingenuity of this folk is very well shown when we find that no two boards on either end of the building have the same design. The work is done by smearing with mineral pigments and the effect is singularly grotesque. The carvings of the entrance ladder on one end and of many of the supporting posts is as obscene as can be.

A small square hole gives entrance to a large dark room in which is little in the way of furniture, merely a few places on the floor where clay has been laid down for fire-making.

About the wall are piles of objects which can hardly be distinguished in the dim light.

Soon a man steps up and takes hold of something, and we see that he has one of the curious hour-glass shaped drums, for drums are sacred and are kept in here along with the great flutes. These are very long and very difficult to blow and are usually only heard at night, a heavy mysterious roaring.

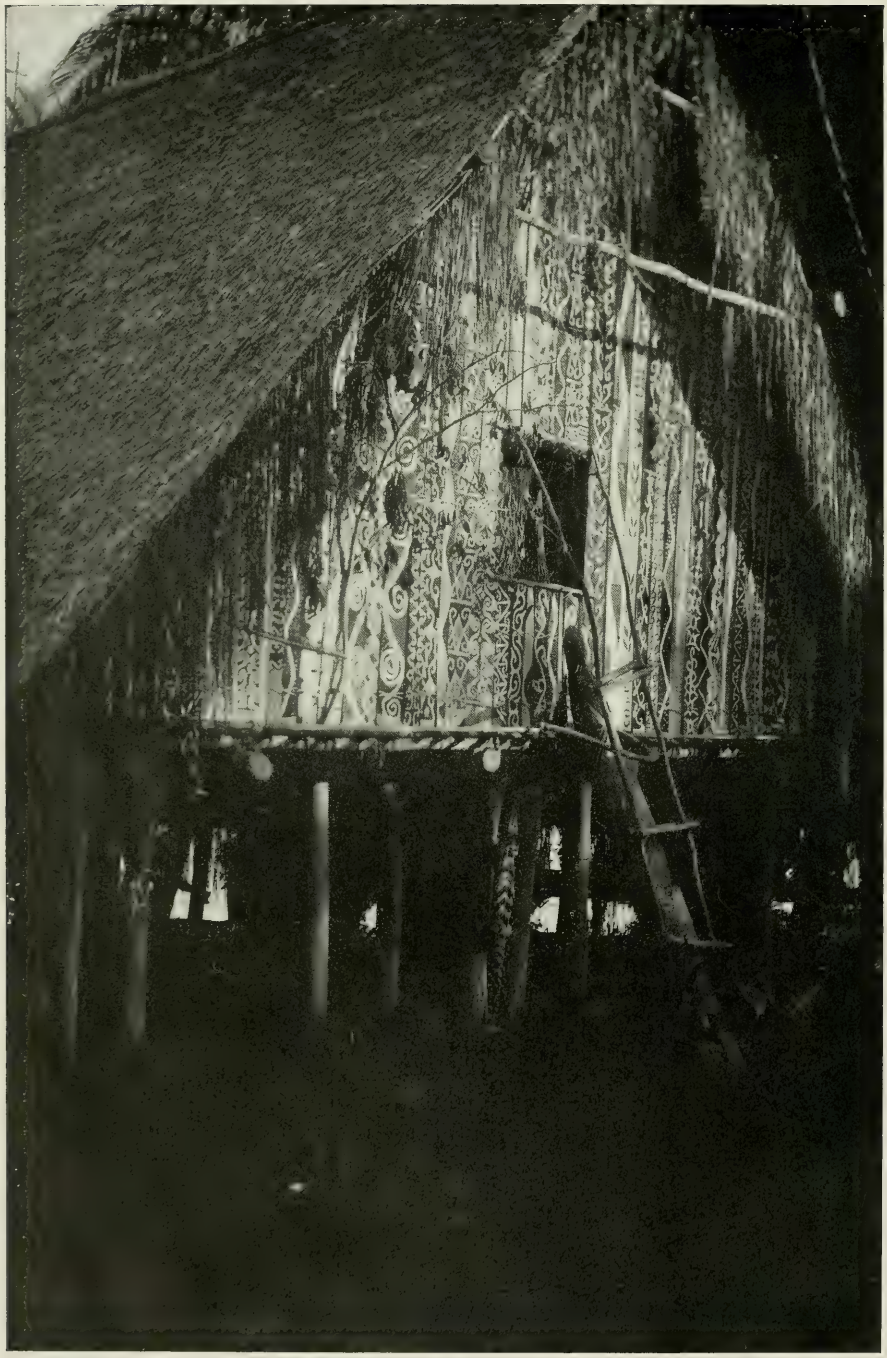
Two men each take one of the instruments and stand opposite each other; they blow into the end of the bamboo, and the length runs out so far that each man straddles his partner's flute. In blowing, the body is swayed from side to side in the straining effort to exhale as strongly as possible.

The noise produced is like no other sound and to the Papuan it is sacred. The flutes play some part in the initiation ceremonies, but here our knowledge ends, for so far no one has successfully delved into the many secrets which go to form the religion of this people. They are reticent in giving information as to any of their rites.

One thing we soon learn, no woman ever comes near a "temple," and every article in it is forbidden to her to either see or touch. The people say that should a woman see, for instance, a sacred flute, she would sicken and die in less than two days. Entrance into a temple would be punishable with instant death; but such a thing would never enter a native woman's head.

At first the "korano," or head man, and the warriors refused absolutely to let Mrs Barbour even look in; but finally, after much talking and many presents, they consented, and she entered, the first and only woman who was ever in the Djamna "temple" or who has ever seen the playing of the holy flutes.

Now the "temple" at Tobadi is quite unlike any of the others—as unlike as is the house type of this village from that in Geelvink Bay. Here the temple is for sacred purposes only and the boys and

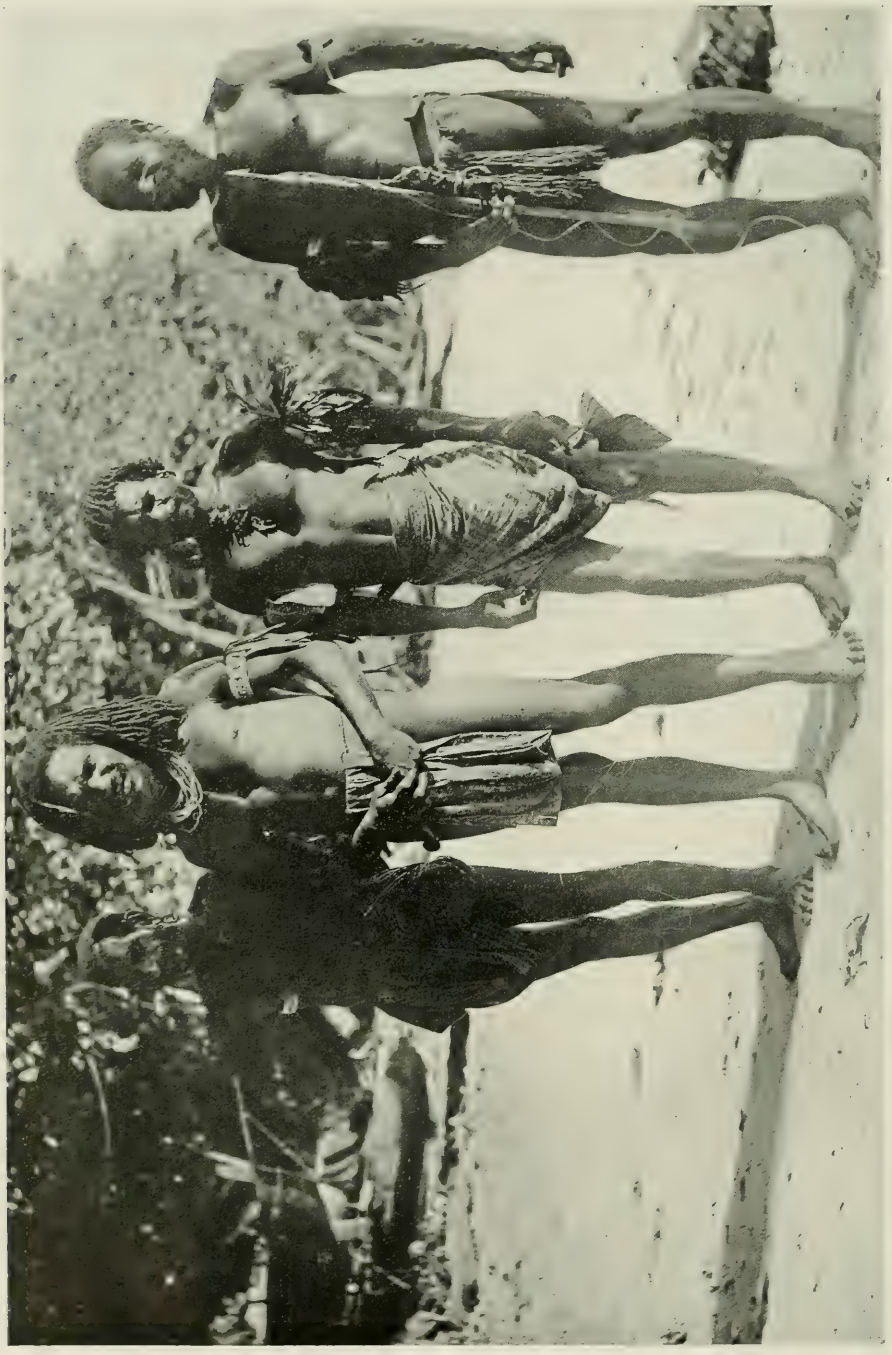


THE "KARRIWARRI" OR SACRED HOUSE AT DJAMNA

The decorating is intricate and very varied. There is no means of lighting the house from without nor ventilating it. The square door with its curtain of grass is the only entrance or exit. The carved crocodile crawling up one of the supporting posts is a regular mark used to designate a sacred structure.

A MAN OF DJAMNA STANDING BY THE BOW OF HIS CANOE

The hair is worked up with clay so as to lie protecting the back of the neck from the sudden attack of a head-hunting neighbor. Note the difference in physiognomy of this man from the other Papuan types.



MEN OF DJAMNA ISLAND

THE SACRED STRUCTURES OF TOBADI, HUMBOLDT BAY

In the background are many low hills, most of which have never yet been trodden by a white man's foot

THE GREAT "KARRIWARRI" AT THE VILLAGE OF TOBADI, IN HUMBOLDT BAY
Next to it may be seen the decorated shed where the elders of the tribe meet in council

SCENE IN HUMBOLDT BAY

young men on probation, so to speak, sleep in a building near by. They have free access to the "temple," and work at ropemaking and net-weaving behind a screen of palm leaves, where they are hidden from the gaze of any woman.

The building itself, which looks as if it were made of three cones set one upon the other by some Titan's hand, is of great sanctity. The people here, who are as rough and noisy a set of savages as exist, become quite subdued when they enter it, and their voices fall to whispers as they converse. When we tried here, several times, to persuade the crowd to admit Mrs Barbour, a single gesture gave a final answer; that gesture was the swift passing of the hand across the throat.

Happily during our stay on the coast no case of death among the natives was witnessed. The Papuans do not believe in the occurrence of natural death, and it is quite impossible to tell who will be blamed by them for the causing of death by evil influences. Raids and bloodshed often arise from such causes, and many strange practices are used to discover the guilty party.

In many localities the body of the deceased is slowly dried over a fire and the drippings are saved. These must be tasted by any stranger coming to the house, and should vomiting ensue, the party is considered guilty, as the cause of death. In other places this liquor is partaken of by the widow of the dead man as an evidence of her fidelity to him.

After desiccation has taken place the body is generally bent to a sitting posture and, after it has been wrapped in a mat, is hung up among the rafters of the house.

The above leads naturally to the mention of a few other modes for the disposal of the dead. In Humboldt Bay they are simply laid out on a small island and left untouched. In other places they are buried in the ground, in a sitting position, and a fence is built about the grave, within which are deposited various arti-

MEN OF TOBADI VILLAGE, HUMBOLDT BAY

Fond of ornaments, they wear boars' tusks in their noses, feathers in their hair, and in their ears almost anything. The boys, who are not yet full members of the tribe, have their hair cut as the picture shows. This is done by scraping the head with a splinter of shell from the giant clam (*Tridacna*). It is indeed a bloody operation.

TRADING WITH THE NATIVES: HUMBOLDT BAY

PAPUANS FERRYING THE WRITER FROM TOBADI VILLAGE TO METU DEBI ISLAND, IN HUMBOLDT BAY

The man in the right-hand corner was one of our Malay servants and not a native of New Guinea

WOMEN GOING CALLING ALONG A VILLAGE STREET OF TOBADI

They are not allowed to use canoes with outriggers, as they might try to escape. No canoe without an outrigger could leave the sheltered bay without capsizing. The men frequently get their wives by raiding neighboring villages. The women consequently would run away if they got a chance.

A VILLAGE STREET IN TOBADI, HUMBOLDT BAY

The women roll their curls with mud and wear many earrings

PAPUAN GUIDES

These two men were guides when I climbed a high hill to take some views of Humboldt Bay. Before we had gone far I gave them enough tobacco to buy the daggers, made of human thigh bones, which they carried in their arm bands. I followed them with more comfort when I felt these daggers rattling in my own pocket. The men's hair is decorated with blades of grass and orchids.

AN ARCHER AT HUMBOLDT BAY, USING A FISH ARROW

The people here usually wear no clothing at all

THE VERY RARE PROECHIDNA, OR EGG-LAYING ANT-EATER: PHOTOGRAPHED ALIVE PROBABLY FOR THE FIRST TIME

cles which the deceased prized. In some cases they are placed in little houses set above the ground on short posts. These do not last long, on account of the inroads of hogs.

In some cases dead children are reduced to skeletons and these are placed in hollow bamboos.

In the Geelvink Bay region the skull is frequently removed and placed within a large wooden head which is carved from a block of wood. This is considered very sacred, and it is almost always impossible to persuade the people to part with one.

In British and German Papua the custom of wearing part of the skeleton as an amulet is reported. This is unknown in the regions called *Papua Talandjang* (The Land of Naked Papuans) by the Malays. It may be said that this region embraces Humboldt Bay and the neighboring country toward Cape D'Urville. We find, however, in Jendee, on Roon Island, in Geelvink Bay, this custom cropping up again. Here the mother often wears some of the bones of her dead child as a necklace.

The government of the people is simple in the extreme. There is often a chief, but in general affairs are decided upon by the men met in assembly. At Tobadi the assembly house is seen next to the great "temple." In some localities these houses serve some sacred purpose, and the characteristic crocodile is part of the scheme of decorative carving. In Geelvink Bay, on the other hand, no houses exist for this special purpose. The men meet regularly on the front piazzas of the great communal houses and discuss matters there.

Agriculture, of course, has made but slight headway. Sago is here, as in many of the Moluccas, the great main stay of the people. Sago palms grow in great numbers along all the low-lying coastal plains.

Sago is prepared in the usual manner. The tree is cut down and the trunk opened. Then the pith is beaten to loosen it and to render the subsequent washing more effective. This beating is done in the Geelvink Bay region with a heavy wooden club. About Humboldt Bay, however, a curious hammer-like tool

A PAPUAN TREE KANGAROO CLIMBING (DENDROLAGUS URSINUS): FOUND ONLY IN THE FORESTS OF NEW GUINEA

A CASSOWARY AT SORONG, NEW GUINEA

The young birds are driven into nets stretched in the woods; then they are kept tame near the village until a feast time. They provide food, feather ornaments, hair combs, bone daggers, and arrow-points of bone splinters and toe nails.

is used, the head of which is made from the same stone as are the stone adzes, only instead of being axe-like in shape they are round, with a hollow in the front face, leaving a rather sharp rim.

After the pulp is well beaten, water is run into the now well-hollowed trunk. This water is generally obtained by using other old tree trunks as leaders and turning in a small brook. The flow after passing the pulp, which is agitated by hand, is generally run into a large canoe. Here the starchy matter settles, and when the water is drawn off this is packed into a receptacle of woven palm leaves. The whole affair hardens and will keep thus, while dry, almost indefinitely.

Wallace gives an illuminating account of how easily a deal of this food may be obtained. He says: "It is truly an extraordinary sight to witness a whole tree trunk, perhaps twenty feet long and four or five feet in circumference, converted into food with so little labor and preparation. A good-sized tree will produce thirty tomans, or bundles, of thirty pounds each, and each toman will make sixty cakes of three to the pound. Two of these cakes are as much as a man can eat at one meal and five are considered a full day's allowance; so that, reckoning a tree to produce 1,800 cakes weighing 600 pounds, it will supply a man with food for a whole year. The labor to produce this is very moderate. Two men will finish a tree in five days, and two women will bake the whole into cakes in five days more; but the raw sago will keep well and can be baked as wanted, so that we may estimate that in ten days a man may produce food for the whole year."

These people do not by any means live on sago alone. Fish, flesh of pigs, kangaroo, opossums, and of cassowary and other birds vary the monotony. The fish

may be speared, shot with arrows—a feat at which the Papuan is truly an adept—or taken with net or trap. The pigs are hunted and speared or the young are captured and brought up in the village. It is by no means uncommon to see a Papuan woman nurse a young pig.

The young cassowaries are raised and wander about freely in some places. When the old birds are hunted, the people are very cautious in approaching them, for the kick of a big bird will do more harm than a wild boar can do with his tusks. Opossums and birds, especially the Goura, or great crowned pigeon, are shot with specially made, small, light arrows. These are also used in obtaining the birds of Paradise.

The notes of this and the preceding paper give in bare outline form some of our observations. The land is beautiful, the people are interesting, but far be it from me to paint the region as one suitable for any to visit except the naturalist or ethnologist. He expects insect pests, fever, heavy damp heat, an often most inhospitable reception ashore, and almost every other discomfort imaginable. These he will find in abundance.

There is still grave danger from the natives in many localities, and the coast region is one of the most unhealthy for white men in the world.

Curious to relate, our Javanese bird-skinners suffered more from fever than did we. Our head collector, Bandoung by name, reached Java barely alive, and for long his life was despaired of. I have heard since that he was recovering slowly. One poor boy from the island of Ternate, a garden spot in the Moluccas, lies buried near the beach at Manokwari.

Our thanks are due to many for assistance, especially to the officers of the little *S. S. Both,* to many officials in the government service, and to Mr Sedee, a merchant of Ternate. He has made several trading trips to Papua and his knowledge of local customs and of the Ansus dialect was always most courteously at our disposal.

LEAVING NEW GUINEA

Malay traders from the ship and Papuans in double and single outrigger canoes

THE PACIFIC: THE MOST EXPLORED AND LEAST KNOWN REGION OF THE GLOBE

The Organization of the Pacific Scientific Institution at Honolulu

By Leopold G. Blackman

Principal of Allüolani College, Honolulu

AMONG the most important of the great undertakings yet to be accomplished by the modern investigator is a complete scientific exploration of the Pacific Ocean. Although some centuries have elapsed since the first adventurers of western Europe tempted the dangers of this vast region, the Pacific offers today the largest area on the globe for scientific investigation and locks within its mighty shores information the acquisition of which would be of more benefit to modern knowledge than that to be derived from the prosecution of any similar undertaking.

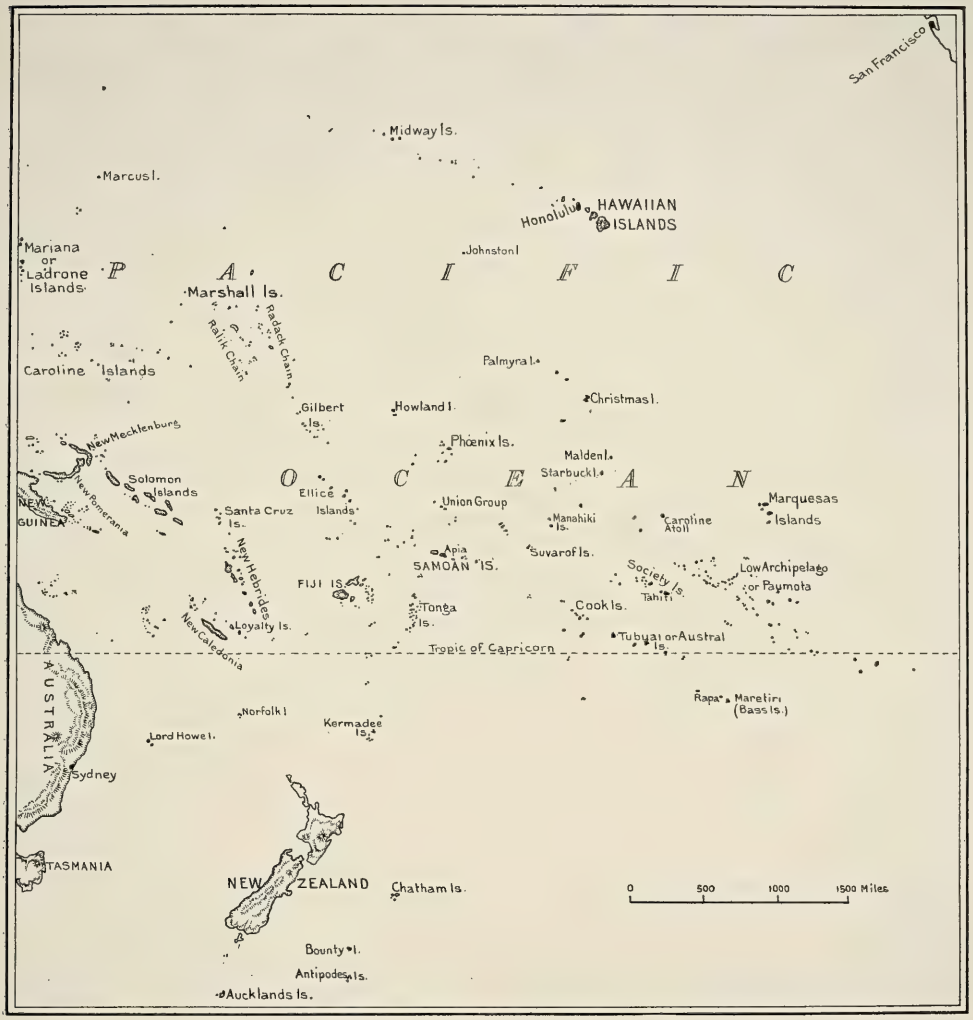
Foremost among the great benefactors of our race have been numbered many naturalists, and the names of Darwin, of Wallace, and of Dana will always be associated with those who have contributed much to the sum of modern knowledge. The researches of such workers have immeasurably extended the horizon of human intelligence and have helped our race to break away from the narrow confines and set formulas of ancient habits of thought.

The investigations of these great men were conducted in this same ocean region to which the attention of the scientific world is now being turned. Important as was the result of their achievements, it has only made us vaguely acquainted with the extent of the work yet to be accomplished and of the perplexing questions to which modern learning demands answer. The scientific exploration of the Pacific is fraught with so much importance that it will immortalize alike the patrons whose beneficence shall make its prosecution possible and the workers who shall bring it to a successful issue.

From the time the first hardy mariners of the old world entered the Pacific, expeditions innumerable have visited this immense ocean. In the early days of its history the vessels of Holland and Portugal entered from the west and strove for possession of the coveted Spice Islands; the keels of Spain ventured from the east in pursuit of the elusive gold, of which they were to find none, and have left only the empty name of Islands of Solomon to recall to us their vain hope; the English adventurer haunted its wastes to prey upon the weighted treasure-ships from Mexico laden with Spanish gold.

Early government explorations

In less remote times came the early period of government expeditions to the Pacific. Of these, the English were foremost in enterprise and in the results which were achieved, although the French, Spanish, German, and Russian governments also did good work. The tragic fate which has befallen so many Pacific explorers is proverbial and has spread an atmosphere of mystery and romance over the story of adventure and discovery in this part of the world. Cook, Magellan, Mendaña, and La Perouse are but a few of the illustrious roll of voyagers whose lives have been sacrificed in their endeavor to solve the mysteries of the Pacific. The narratives of the early Pacific explorers afforded a wealth of eagerly sought literature,



SKETCH MAP OF THE PACIFIC ISLANDS

whose influence has to this day tinctured the writings of the historian and novelist of this wonderful region.

In still later years the United States government has interested itself actively in various Pacific investigations and has added considerably to the oceanography of the region.

The whaling industry also carried its toilers into many remote parts of the great ocean and left an indelible impression upon the native population.

To these legitimate enterprises are to be added the incursion of a host of piratical and predatory exploiters, who have preyed upon commerce, pillaged and kidnapped the native races, and made the white man an object of hatred throughout the regions in which their nefarious work was carried on.

THE MORE FEROCIOUS ISLANDERS AVOIDED

In spite of these activities of the white man, whether of good or evil repute, the

NATIVE ASSEMBLY HOUSE: BORA, SOCIETY ISLANDS

The early Pacific explorers found such structures on many islands; great native gatherings were held in them

Pacific Ocean remains today the most *explored* but the least *known* extensive region of the globe.

After the days of early exploration the interest of the white man centered chiefly around those Pacific archipelagoes which were either situated on convenient commercial routes or where the friendly disposition of the natives invited the newcomer to sojourn among them. This quality of racial disposition has been very instrumental in determining the development of certain island groups and accounts in part for the fact that among the various archipelagoes, these inhabited by the Polynesian race have been the great centers for the white man and have therefore departed from primitive standards most. In many cases the reputation of ferocity and cannibalism of islands inhabited by Papuans and other races hostile to strangers has warded off the tide of civilization for many generations and left the island continent of New Guinea and such archipelagoes as the Solomon Islands to this day very much in a condition of primitive savagery.

In order to place before scientists the record of the Pacific which yet remains, there has recently been inaugurated at Honolulu, Hawaii, the Pacific Scientific Institution, whose object is to stimulate public interest in the great work of Pacific exploration and to take definite steps toward its accomplishment.

The main object of the institution is to promote and carry out a complete scientific exploration of the Pacific Ocean realm. The chief interest will largely group itself around ethnology—that is, around subjects affecting the races of mankind which inhabit the ocean archipelagoes.

More theories have probably been propounded and dogmatically asserted concerning the origin of the Pacific islanders than of any other race of man.

The study of this important question will not only seek to determine the mode

of entry of man into the Pacific—for it is agreed that the inhabitants of this region could not have evolved there, but must have entered it as emigrants, whether voluntary or involuntary, from some other branch of the human stock—but the inquiry will no doubt throw much illumination upon the evolution of the human race itself.

THREE DISTINCT RACES

Much valuable material will also be collected to assist in a better understanding of the growth of our own civilization from elemental savagery, for it is reasonable to suppose that the primitive wants of man in different ages and regions have called forth similar expedients to satisfy them.

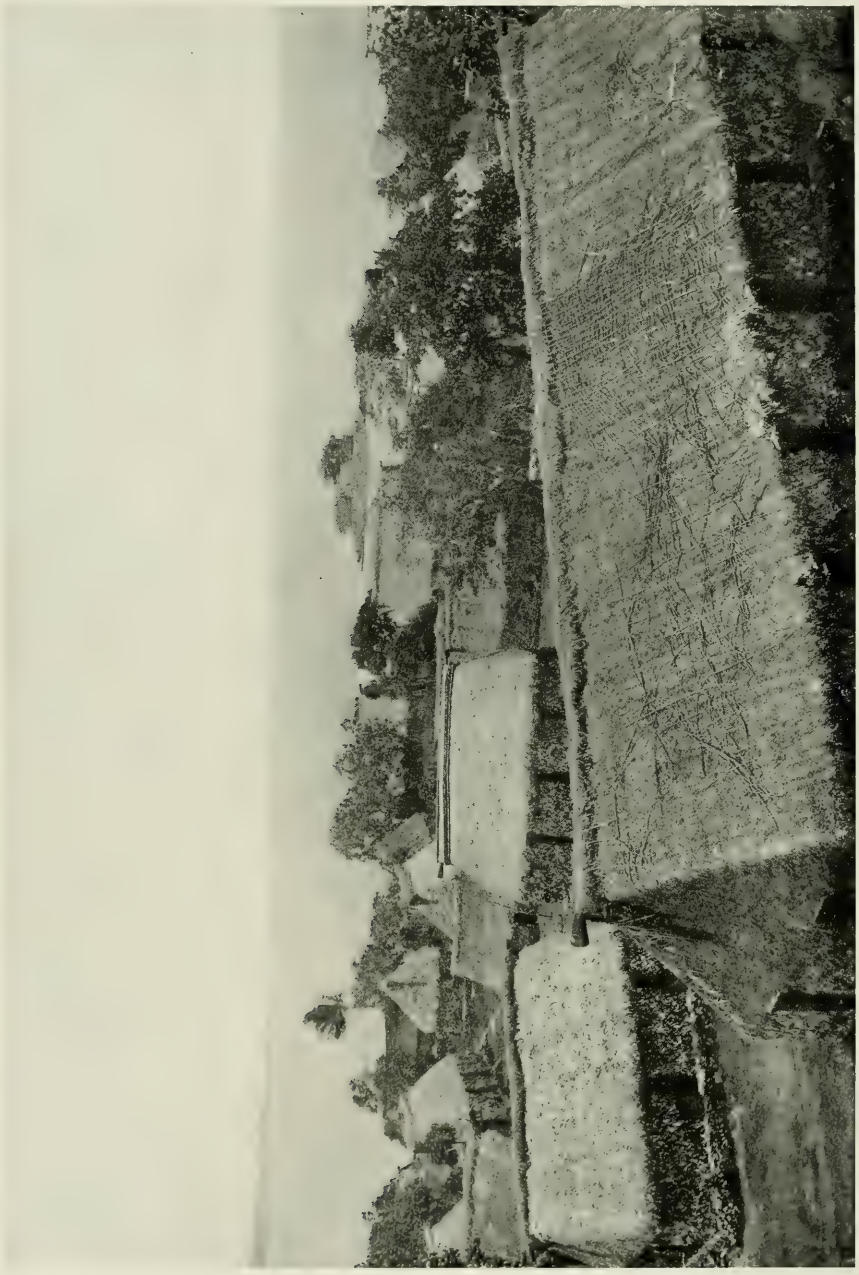
Other important objects of investigations for the ethnologist will touch the various racial types in which the Pacific islanders are divided. Of these, three are generally recognized, of whom the Papuans and Polynesians appear to show the widest divergences, with the Micronesians occupying the intermediate ground and possessing affinities of race, language, and custom within the other two. Eliminating the Micronesians from the question for the moment, the presence of two distinct races of man in the Pacific suggests two periods and sources of immigration and adds difficulty to an already perplexing question, for the demarkation between the divisions of the races is by no means well defined, but is complicated by the admixture of many other races of both oriental and occidental origin.

The Papuans may be generally said to inhabit New Guinea, the Solomons, New Caledonia, Australia, and Fiji. Their most obvious characteristics may be briefly summed up by stating that they are irreligious, democratic, quarrelsome, cannibalistic, and hostile to strangers. They possess no hereditary chiefs, paint or scar the body rather than wear clothes, cook in earthen pots, chew betel, and their speech is broken up into a number of apparently irreconcilable dialects. The Papuans are the least attractive of any Pacific islanders, and the island groups which they occupy are among the least known of the Pacific and have been for many generations shunned by mariners and associated with everything that is of evil repute in the record of the ocean.

The Polynesians in many attributes are greatly at variance with the Papuan islanders. They possess, generally speaking, an elaborate religious system, an established order of hereditary chiefs and well-defined social castes. They are friendly to strangers, fond of dress, expert manufacturers of Kapa cloth, and intrepid seamen and navigators. They tattoo instead of scar the body, seldom practice cannibalism, cook in earthen ovens instead of in earthen pots, drink awa, and possess a common language understandable throughout New Zealand, Hawaii, Samoa, Tahiti, and the Paumotu Islands.

Of all the Pacific races the greatest interest attaches to the Polynesian islanders, but it is unfortunately these people whose primitive customs and racial types have been most broken up by modern intercourse. The study of the Polynesian language will afford a most fascinating field of inquiry, and its proper investigation will require a knowledge of the tongues of the people inhabiting the region between the eastern coast of Africa and the western coast of South America.

The Malayo-Polynesian language possesses the distinction of being spoken by indigenes over the widest area of any language of the world, for it embraces two great oceans and extends from the island continent of Madagascar to the isolated islet of Rapanui. This latter insignificant output of Polynesian culture is distinguished as affording specimens of that remarkable ideographic writing which lifts the race well above the plane of savages and proves it to have advanced toward a culture worthy of comparison with primitive civilization. The deciphering of the Rapanui records has not yet been accomplished, but its solution should be achieved when all speci-



MABU, A VILLAGE IN THE FIJI ISLANDS

mens of the art have been assembled for comparison. The translation of their writing will perhaps unlock knowledge of immense value to many questions of the origin, migration, and history of the Pacific races.

DID THE MOON COME OUT OF THE PACIFIC OCEAN

Of not less importance will be an investigation affecting the origin of the Pacific Ocean bed itself—the greatest depression on the globe. Many ingenious theories have been advanced on this subject, and among these the two following are interesting:

The first hypothesis suggests that the Pacific area was formerly occupied by a land-mass which has subsided below sea-level, probably by volcanic agency. The volcanic system extending round the Pacific littoral of Asia and America lends considerable color to the theory, and would represent the edge of the sunken plain. At this point of fracture the subjacent molten contents of the earth have found vent, and thus by dispersal have built up the coast mountain chains. If this be true, the present island groups of the Pacific would represent the summits of former mountain systems.

Whatever the cause of the isolation of the present archipelagoes, evidences are not lacking that they have at some time been connected with other land-masses. The absence of mammals of any importance, however, would suggest this period to be so remote that the severance occurred before the evolution of these creatures. The land mollusks, whose nearest affinities must be sought in geologic fossils, also point to the islands as having been isolated in the remote past.

The second geological theory of the Pacific which has claimed credence is that the land-mass which formerly occupied its depression was, in the age before the solidification of the globe was too far advanced, whirled off by centrifugal force, and now composes our satellite, the moon. A comparison of the shores of west America and east Asia with other evidence suggests some truth to this remarkable theory, for the coast lines will be seen to bear the same relation to one another as that possessed by the indentures of a legal document.

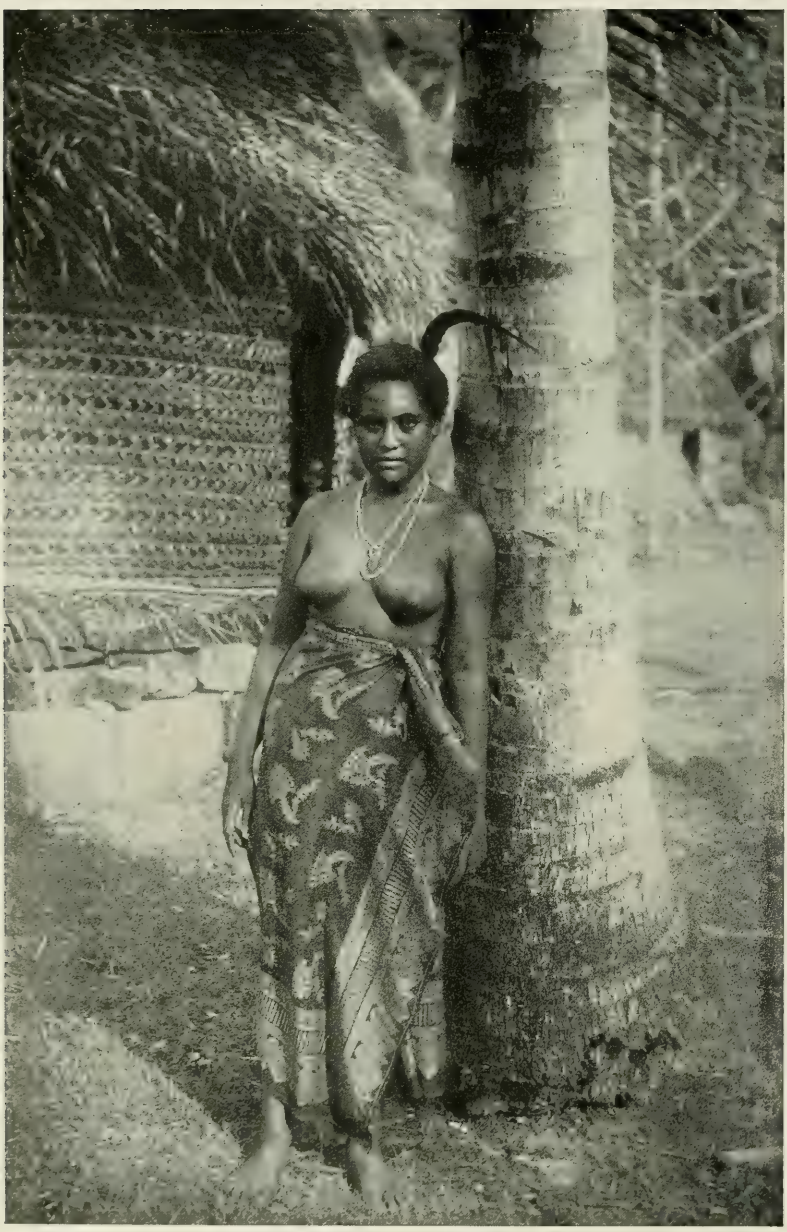
Why do Pacific mammals, reptiles, and birds become more scarce as we progress across the ocean from east to west? What is the origin of the Hawaiian birds? How did the flightless birds of New Zealand originate, and what was the evolution of the gigantic wingless moa? Why is the nearest living relative to the extinct dodo found in Samoa? What is the import of the presence of the same species of a fresh-water fish in two rivers situated on opposite sides of the Pacific? Have the Australian marsupials a common origin with those of America, and does their presence contribute to the theory of an intervening continent? These are a few of the many interesting questions whose solution would contribute much to the establishment of truths of material importance to modern knowledge.

The investigation of all the above questions, except perhaps those affecting such stable subjects as geology, must be undertaken in the immediate future if any satisfactory result is to be achieved.

The total disappearance of the inhabitants of some islands has created a gap which is now as impossible to bridge as that between our own civilization and the European Stone Age. In this way much that is necessary to a true understanding of the Pacific has forever disappeared, and many perplexing problems can now never be solved. The work of the early navigators was sufficient to the knowledge of the day in which it was conducted, but the significance of habits, of custom, of rites, of legends, and of arts was ignored or wrongly interpreted, and an inexhaustible store of priceless information remained unheeded until it has been effaced and has forever passed away.

THE EXTRAORDINARY CIVILIZATION OF THE POLYNESIAN

And here it may be said that the plane of culture which has disappeared before



ON KAMBARA ISLAND, FIJI

NATIVE FIGHTING MAN: MOEN ISLAND, TURK LAGOON, CAROLINE ISLANDS

a hardy and aggressive civilization has in some cases been of a much higher order than the intolerance of the early white man could appreciate. With regard to the Polynesian race, this is especially true.

The elaborate religious system of this people had attained a perfection and elaboration of ritual such as has been equaled by few other people. The origin of the dreaded taboo and its development into a wonderful religious and political engine indicates an intelligence of no mean order. The ceremonial by which the hereditary castes and offices was maintained and in which social system was upheld bears witness to a succession of remarkably endowed political rulers.

The tremendous irrigation tunnels by which mountain ranges were pierced required alike great mechanical skill and some knowledge of the principles of surveying. Their elaborate code of water rights, their knowledge of the movement of the heavenly bodies, their familiarity with the currents of the great ocean and their protracted voyages thereon, their evolution of a system of writing, are all matters which excite our admiration and bear testimony to the fact that the Polynesians, so far as permitted by the material accessories around them, had developed a culture which compares favorably with that possessed by other races at the dawn of authentic history.

The ethnological result of the missionaries' presence among the natives is also to be recorded. The motive which actuated these workers is irreproachable, but as a class the ministers of the gospel have been singularly deficient in realizing the importance of preserving an account of native customs and habits. Many noteworthy exceptions, however, occur to this statement, and such names as Ellis and Chalmers will always be associated among those who have contributed to Pacific knowledge. By the not unnatural antagonism of the Christian missionaries to the heathen cult, all that pertained to the native religion was sternly suppressed. The native converts to Christianity, in the zeal and bigotry of their new faith, in turn did everything in their power to suffocate the early religion, and thus effected the extinction of much which cannot be determined.

Together with the ban placed upon the native religion, the whole realm of myth, genealogy, legend, and history fell into disrepute, until, instead of preserving a more or less accurate record of their race in their elaborate oral traditions, the native tribes in many instances now present the condition of isolated units, lacking the record of their past and severed from their affinity to other peoples. One beneficial work of the missionaries was the translation of the Bible into many native tongues, which has thus helped to preserve a record of the languages of the region much in their early purity.

AN IMMEDIATE EXPLORATION NECESSARY

It is probably not too much to say that in the Pacific as great changes are now wrought ethnologically in five years as without the influence of the Caucasian would be brought about in many generations. Another ten years will probably be too late in which, with any prospect of satisfactory result, a complete ethnological exploration of this region can be conducted. Unless the work is actively undertaken long before this period has elapsed, the value to be derived therefrom will be very greatly diminished.

The exploration, therefore, must be vigorously prosecuted now, or on the present generation will lie the reproach of having refused to preserve information of vast importance to the scientific workers of future generations. We of our time cannot content ourselves with the plea upon which we can acquit our ancestors of having neglected this work. They at least erred ignorantly, and even had they been cognizant of its importance were not so well equipped for undertaking it as are we of the present day.

Many of the causes which have contributed to the destruction of the inhabitants themselves have also been at work in undermining the majority of the Pa-

cific fauna and flora. Protected by their isolation from the struggle for survival which continental species must continually maintain; nurtured in an environment admirably tempered to an easy existence; rendered non-resistant to introduced disease by long generations of immunity; situated on small islands which afforded no means of retreat, the native species of both animal and plant life have in most cases proved unable to exist in the aggressive competition with hardier types.

The decay of the native bird life in many islands is remarkable, although other than exotic influence has assisted in their destruction. On the island upon which Honolulu is situated, more than half the native species of birds have become extinct during the last century. Upon the land mammals of the region the effect has been even more disastrous, and most of the few aboriginal species have so utterly disappeared that no reliable description of them has been preserved. In some cases even their former existence is questioned. The botanical species have in the same way been crowded out by more persistent foreign plants or have been destroyed by domestic animals.

Upon marine life very little modification appears to have as yet taken place, and it is safe to presume that, unless some altogether unexpected factor arises within the region itself, this will long remain stationary. There are, however, evidences which suggest that the Hawaiian coral reefs are not in such a vigorous condition of growth as formerly.

ADVANTAGES OF HONOLULU FOR PACIFIC EXPLORATION

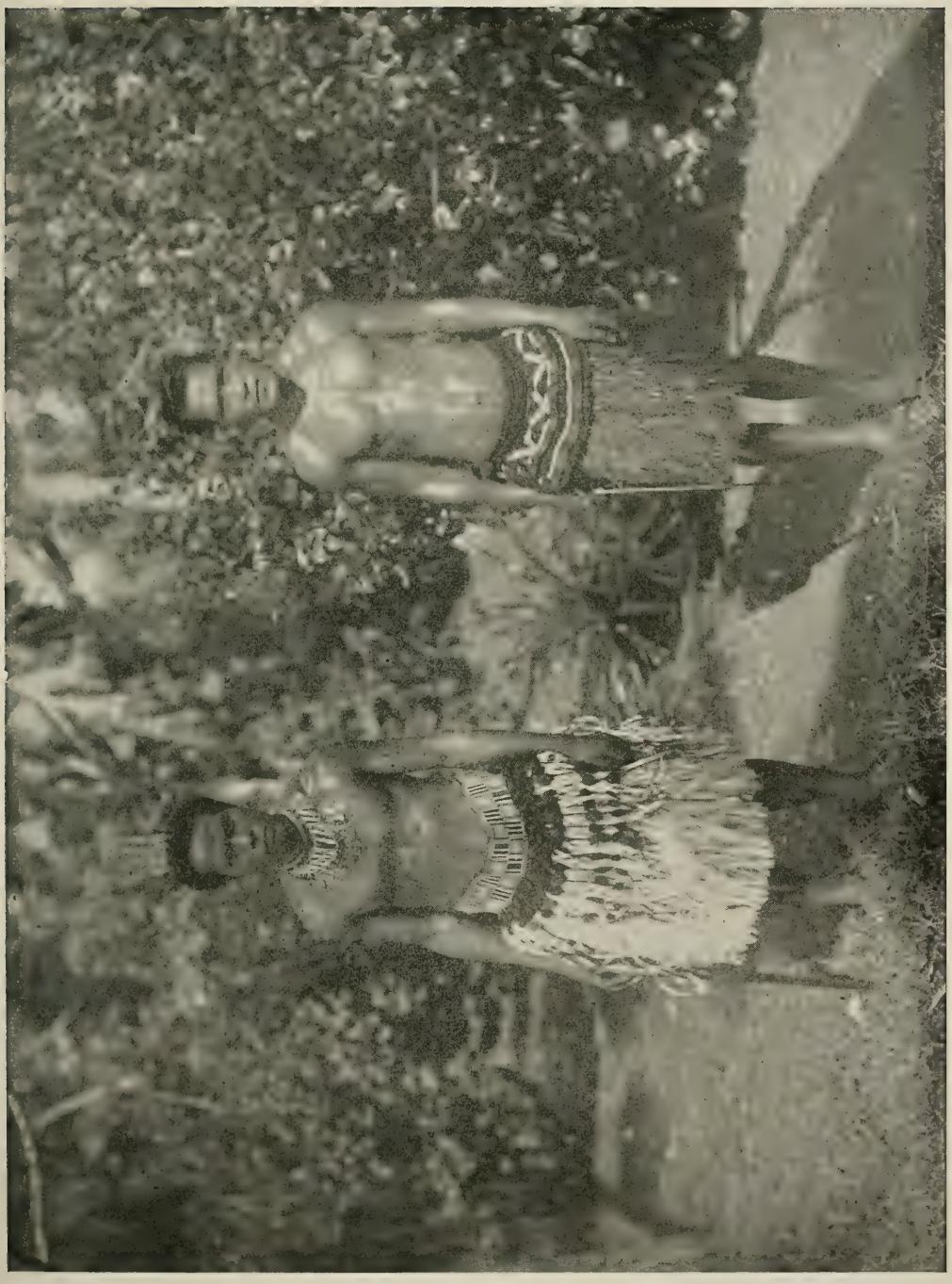
Situated in mid-Pacific, Honolulu affords the best center from which this great work can advantageously be conducted. The foundation of the Pacific Scientific Institution proves that the opportunity of this favored city is appreciated by its inhabitants, and that the work which has lain so long neglected will soon be commenced.

With headquarters at Honolulu, it is proposed to dispatch parties of trained workers upon a specially equipped vessel to the various island groups. At convenient centers, substations will be established, through which communication with the home office may be maintained. Each expedition will consist of a corps of experts, who will carefully record all that is found of sufficient interest to preserve. A careful and elaborate series of anthropometric data will be tabulated; the languages, religion, law, mythology, legend, and genealogy of each people will be recorded; their technology, art, and medicine will be exhaustively studied. Series of mammals, birds, reptiles, insects, and botanical specimens will be preserved; the coral reef, the marine fauna and flora, the ocean currents, the geology and the meteorology, will all be investigated, until the whole realm of nature has yielded up its store of scientific data.

It is anticipated that the work of exploration will be completed in fifteen years. As soon as they can be published, exhaustive accounts upon the ethnology, zoölogy, and botany of said groups will be issued. The most important work of publication will be deferred until all the data of the various expeditions have been received and reduced to order. Under the assistance of the foremost scientists of America and Europe, the records of the whole exploration will be then examined and compared. The publication of these final volumes will probably rank as one of the most interesting and important additions to human knowledge that has ever emanated from a single press.

During the fifteen years in which the exploration is in progress, many other scientific institutions will be established by the central one, supplemental to its work. Of these, one of the most important will be a botanical garden and garden of acclimatization, in which will be grown and studied many of the important plants procured by the collectors. The production of new and improved varieties of tropical fruits and flowers will be an important work of this depart-

OLD KING OF MUAL DISTRICT AND TWO OF HIS WIVES: TURK LAGOON, MOEN ISLAND, CAROLINE ISLANDS



MEN OF PONAPI ISLAND, CAROLINE ISLANDS: *a*, NATIVE KING'S COSTUME; *b*, COMMONER'S COSTUME

DAUGHTERS OF CHIEF NAKIRORO, OF TARI-TARI ATOLL, GILBERT GROUP

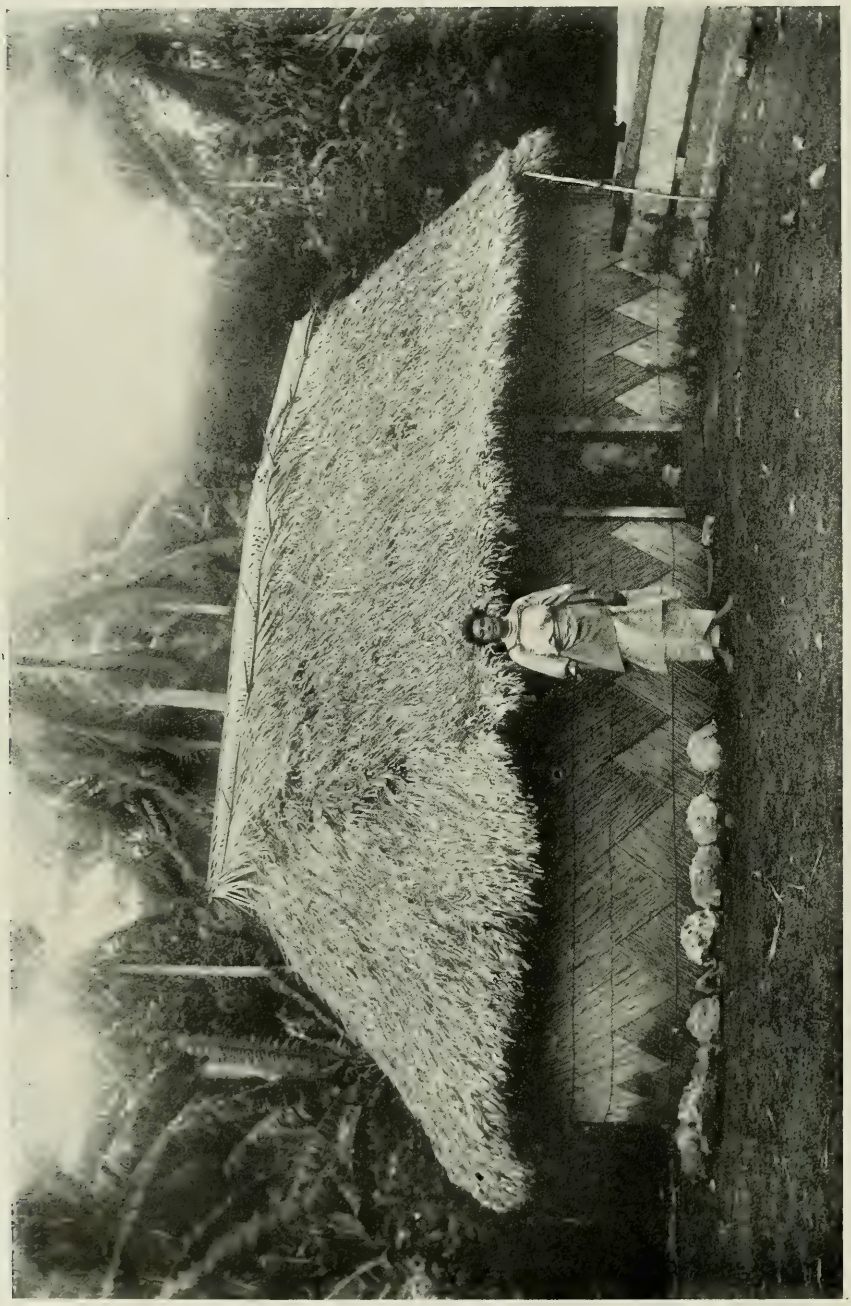
ment and one which should make it famous throughout the world.

When it is considered that our present varieties of such fruit as the apple have been evolved by careful selection during many generations, the future of many tropical fruits which have as yet not similarly been operated upon seems almost limitless. The unrivaled situation of Hawaii and the diversity of climate available from sea-level to mountain peak should in time render a botanical garden established there as beautiful as any in the world.

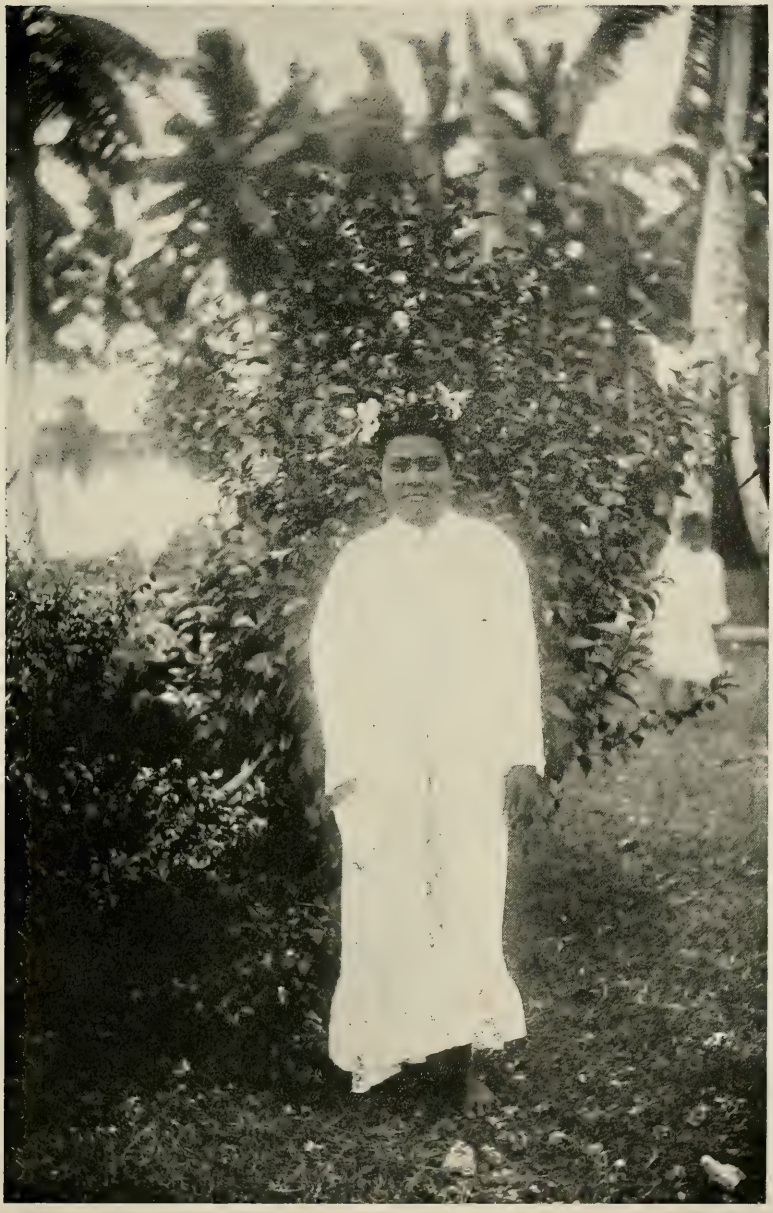
A zoölogical garden for the reception of the Pacific mammals and reptiles, including an aviary to accommodate its rare and wonderful birds, will also be established. A wholly untrodden field of practical research awaits the economic study of the birds of this region, the importance of which work can scarcely be overestimated. The accession of fishes to the already established Honolulu Aquarium will without doubt make the exhibitions in these three institutions one of the most complete collections of the fauna and flora of a single region which has ever been assembled together.

The study of marine life will also be pursued and a biological station will be equipped for this purpose. Here will be established tables for the study of marine biology, to which will resort stu-

NATIVE WOMEN AND CHILDREN: TONGUFALI VILLAGE, FUNAFUTI ATOLL, ELLICE GROUP



HOUSE OF JOHNNIE TOGA, A NATIVE CHIEF: VAVAU ISLAND, TONGA GROUP



NATIVE PRINCESS "MELE:" NIUE ISLAND, TONGA GROUP

NATIVE CHILD: HEREHERETUE ATOLL, LOW ARCHIPELAGO

dents from many other countries. Scientific men have come to regard the biological station as one of the most important fields of original research, for from the study of the elementary cellular creatures of the ocean it is expected that the baffling enigma of the origin of life may at length receive enlightenment.

As the result of the survey, a wonderful collection of ethnological specimens will also be assembled in Honolulu. The disposition of these among the various institutions of the world which collaborate in the undertaking will be an important consideration. The main collection should, however, be retained to augment the already goodly collection of the celebrated Bishop Museum.

As time goes on and when the whole series of establishments are in operation, Honolulu will rank among the foremost centers of scientific research. The antiquarian, the ethnologist, the zoölogist, and the botanist will look to the Hawaiian Islands as preserving the record of many of the most interesting objects of their various departments of learning.

It is anticipated that when the establishment of the Pacific Scientific Institution becomes known, many patrons of science will avail themselves of the opportunity of contributing to an undertaking which will so greatly benefit our race. The manner in which the Institution has been incorporated and the trustees under whose administration it has been placed assure us that the long-delayed work of Pacific exploration will shortly be commenced.

BISKRA, THE ZIBAN QUEEN

By Mrs George C. Bosson, Jr.

The photographs accompanying this article were sent to this Magazine by Miss Louise Coleman, those on pages 578 and 579 being taken by her, while the others were purchased.

TO the uninitiated, what vision rises at the thought of an oasis in Sahara? I confess that in my mind there used to be the picture of sparse grass struggling through smooth yellow sand, a few tall, fronded palms, a well and some camels, with burnoused Arabs kneeling in the background against a setting sun—a *tout ensemble* traceable, doubtless, to a cut in some primary geography. I know I never expected a miniature city, with churches, clubs, markets, hotels, barracks, shops, with cafés-chantants and wickedness sufficient to have earned the sobriquet of "la petite Paris"—on my word, no. I always had a latent romantic leaning toward the bold Bedouin and "king of the desert," and to the desert we went to get a nearer view.

We had left behind us the snowy stateliness of the Atlas Mountains and the Kabyle villages with their vivid impressions of Eastern existence. We had seen Jacob and Joseph, as one imagines them to the life, Ruth in the fields and Rebecca by the well, and a white-robed patriarch coming down the mountains with a light about his head as the sun's last rays burst upon him, and in his arms a petted, straying lamb. And as we sped on in the twilight, the shepherds watching their flocks by night, "all seated on the ground," and one shining star above, made peace on earth seem nearer, though in the world of telegrams and newspapers which we had left far behind wars and rumors of wars were cruel and rife.

At Setif, a French garrison village high up in the mountains (Setif is at an elevation of 3,700 feet), we spent the last night before entering the desert, and

SKETCH MAP OF ALGERIA

the combination of colonist and native in the tiny town made us realize the importance of the problem which, together with the "question Kabyle," now confronts the French republic. The little hotel was comfortable and clean, and the pale blue and scarlet coats of the military men, the white burnouses and gold-embroidered waistcoats of the Arabs, the black cassock of a priest, and the fur-trimmed jacket of a visiting *chasseur d'Afrique* gave the place almost the appearance of a costume ball. The colonel of the regiment was dining alone, and within joking distance were five spruce young officers, whose grades of rank were almost as evident from their manner as from the number of stripes on the bright *kepis* ranged on the wall beside them.

An early start next morning was an effort to a lazy woman, but the keen air, the glorious sunrise, and the sights of Setif in morning light were generous rewards. From glimpses through open doors, and dark circles under the eyes of very evidently up-all-night officers, I have an idea that absinthe and seductive green baize tables may be almost as responsible for the worn and jaded look of the bronzed Algerian soldiers as are African suns and forced marches.

At Batnah a stop for lunch, and a disappointed woman listened hard but failed to hear "the lions' roar come down the Libyan wind," for here we are near the great cedar forests where lions and panthers yet lair. "Beyond there lives the Saïd," says the Arabs in the respectful tone in which they always mention the King of the Atlas, and a sample of Arabian philosophy is their proverb concerning his majesty: "He who kills him eats him, and he who does not kill him is eaten by him."

On again, across rocky dunes and by salt lakes, vegetation appearing only in tiny bunches of sage-brush among the stone and sand, with rare clumps of fennel, rosemary, and candytuft, seemingly strayed from a New England garden, once in a while an encampment of Kabyles, surrounded by a corral of thorn-brush, and long lines of cactus and aloe standing out against a burning blue sky.

A herd of antelope pass in the distance, and beyond is a billowy waste of plain in an indescribably yellow, mellow light, with bare hills like sentinels in the background. What is that slow-moving line of dark? What but our first sight of a caravan, twenty or thirty camels with their striped packs, a little herd of goats, Arabs on horseback trot along the line, and plodding, patient figures bring up the rear.

And as we go on over the billowy sands, seemingly our course is stopped; for a line of sharp, needle-like, castellated red mountains of fantastic outline appears, like fortified heights with bastions round their sides, to bar our way. But no, there is an opening, a gate—a gate, indeed, El Kantara of the Arabs, Fromenti's "Porte d'Or de Sahara," and the Calceus Herculis of the Romans; and here was it that the famous Third Augustan Legion was quartered. Vanished are the visions of the oasis of geography days, the oasis veritably bursts upon our gaze, and we have our first sight of what Murray says is one of the three most wonderful views in this wonderful world of ours, while Lamartine's *"tu parais, le desert s'anime,"* comes to our thoughts.

We are told that there are fifty thou-

ZOUAVES AT SETIF

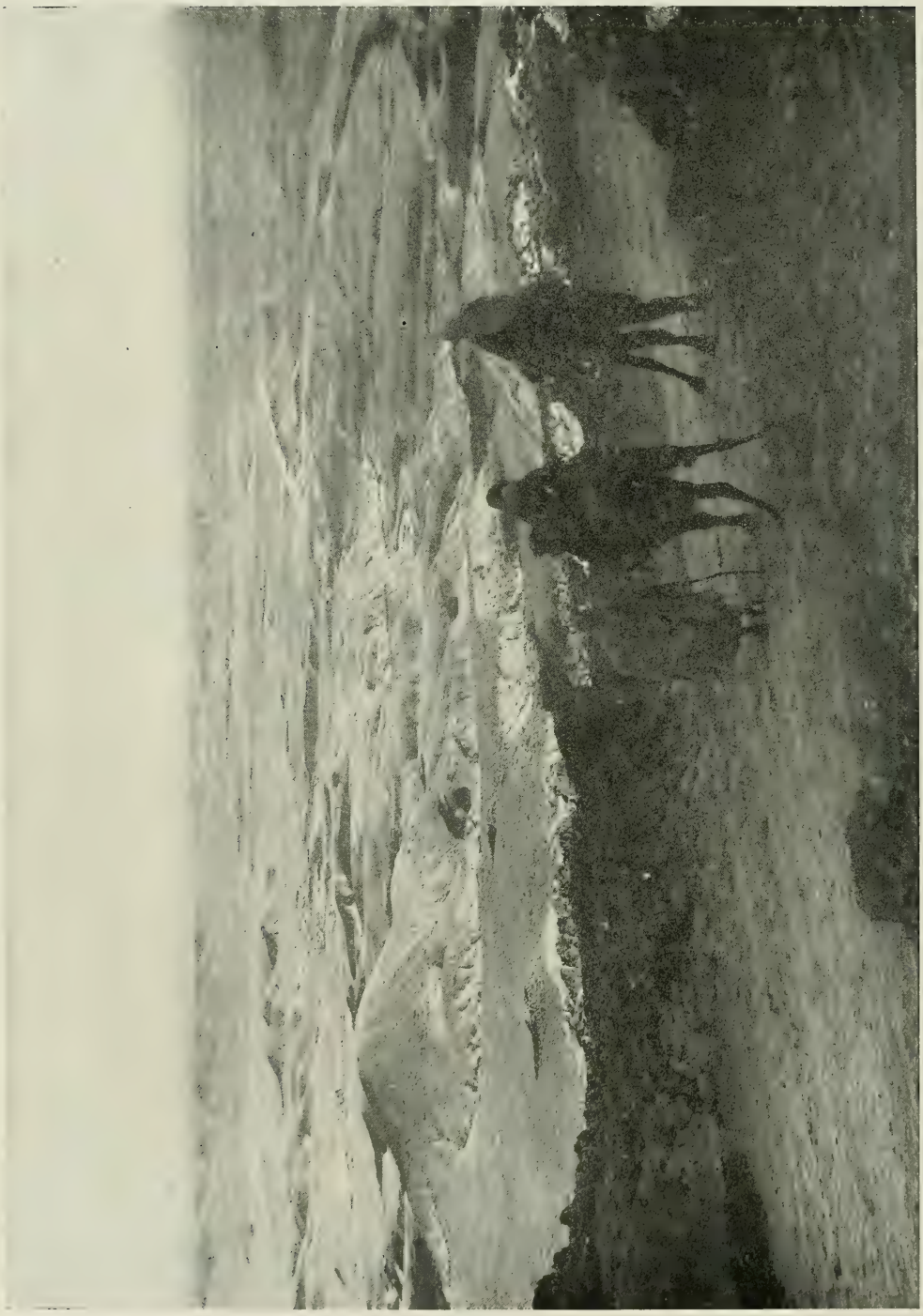
sand trees in this oasis of El Kantara—date-palms, oranges, and figs, the first predominating. There is a waving green sea of foliage set down in the burning sand, with quaint Arab houses nearly hidden in the trees, and square, high watch-towers looming among the palms. These *towers* are towers for the guards who watch the fruit when ripe, for the Arab has notoriously vague ideas of *meum et tuum*. Water everywhere, in wells, in pools, in irrigating ditches among the trees, for the Arab proverb says that the tree of the desert "must grow with his feet in water, his head in fire." As suddenly as it began, the emerald verdure ceases, and there is the golden desert stretching on again in its vastness. Not level though, and here again has the primary geography somewhat deceived us, for in this region Sahara is mountainous and rocky, though this phenomenon is not seen north of Biskra.

Presently some Roman ruins are passed, fragments of cornices and shafts of columns, remains of an aqueduct and masonry, and the ruins of a square fort built in the reign of Caracalla, he of bath fame, who, with his brother-emperor Hadrian, the traveler concludes, must have been a very busy man. Along our way the sand-hills are white with saltpeter, and at the end of a limestone range is the Montagne du Sel mentioned by Herodotus, a hill of bluish-gray rock-salt. The south boundary is the Djebel-bou-Ghazal, and as we approach Biskra the ruins of a Turkish fort are passed, and then, *en face*, appears the square and sturdy outline of Fort Saint Germain, the French fortification guarding the precious possessions of the "Ziban Queen."

We resort to Murray for facts, and learn that we are 360 feet above sea-level, that the oasis is six miles long, possesses 170,000 date-palms, beside tamarind, fig, and orange trees, and likewise possesses what is claimed to be the most perfect climate in the world from No-

SHIPS OF THE DESERT

ON THE ROAD TO BISKRA



LOOKING ACROSS THE DESERT ON THE ROUTE TO BISKRA

vember till May. Its genial temperature, clear sky, and luxuriant vegetation are indisputable charms, and its dry atmosphere makes it particularly curative for pulmonary diseases. A gentle shower during one day was the first rain that had fallen for seventeen months, and yet there is that never-failing supply of delicious cold water from natural wells throughout the whole oasis.

There are five villages in this island of the sand-sea, and the outlying oases of Filiah and Geddecha also belong to Biskra. The Arab villages and the *village des negres* are built of sun-dried mud, with doors and flat roofs of palm-wood. Among the ruins of *le vieux* Biskra, where before the new fort was constructed the French fortified the old Kasbah existing at their arrival, are a heap of Roman blocks and columns, which are all that remains of the Roman outpost of Ad Piscinam. The French village is clustered around Fort Saint Germain, named for a gallant officer killed during the Zaatcha insurrection in 1849, and which is capable of sheltering the whole civil population.

There is a pretty public garden, where feathery pepper trees make a pleasant shade, a church, a mosque, streets of shops, a handsome casino and officers' club, and three good hotels, of which the principal one, the Royal Hotel, is said to be the best in Algeria. It is certainly a delightful surprise to find in Sahara a hotel with every appointment of elegance and comfort. Count de Landon has a charming winter residence here with a wonderful garden, which it was our privilege to visit. He has successfully acclimated many precious tropical fruit trees, among them the mango and the custard apple, and possesses some of the grandest specimens of *Ponciana regia* in the world.

A visit to the market place during the morning is one of the sights of the town and oriental in every tone. Squatting groups of bronzed-legged Bedouins, in brown and white camel's-hair burnouses, are selling cous-cous, dried peppers, and of course dates. Bunches of fresh grass and green barley and thistles are heaped in one corner of the inclosure, Moorish slippers here and a pile of red fezzes there, and souvenirs for the tourist not lacking. For fifty centimes one may purchase a set of graceful gazelle horns, and curious knives and Arabian guns tempt the collector on her way. An ebon negress is selling oranges, an Arab boy in a red fez, and not much else, carries a basket of purple fruit in green leaves, while cloaks, burnouses, turbans, and yakmahs, purple, blue, deep red, and spotless white all crushed together, make kaleidoscopic color in the whitewashed square. Bags of henna leaves, for staining the nails in Arab fashion, send forth their pungent odor, and the aroma of coffee and cigarettes fills the air. A Kabyle girl in red gown, tattooed bluely as to her forehead and cheeks, stained yellow as to her finger tips, passes us, cigarette in mouth, her bangles and anklets clanking as she goes.

Outside a Moorish café a row of Moors, clean in their white burnouses, are solemnly crouched, two of them playing a grave game of chess, but the rest doing nothing to perfection, without a trace of boredom or a gesture of impatience, a state of dreamy delight achieved apparently by habit of mind, a realization of Arabian Keyf. Two merry cantinières go briskly along, and behind them glide two Sisters of Charity. Occasionally a tall figure in white burnouse and dark blue or pale gray cape, with crimson fez and gold-embroidered jacket, passes, and the dark eyes and white teeth flash down in friendly glance. Occasionally, too, there is a suspicion of genuine attar-of-rose whiffed on the air, as one of this oriental *jeunesse dorée* walks by us, and we are reminded of what an Arabian courier once told us: "In my country, if a man have perfume on his clothes, it makes scandal!"

Scandal there may be, even here, but there is no yellow journal. News is cried by a zouave who beats a drum, then stands and proclaims his tale, and passes on to the next street. Noises of all kinds are rife, the impossible consonants of

Arabic are hurled to and fro, the "Illah!" of a donkey-driver pierces the air, the glissade of the musical French slips in, the kneeling camels in the square roar loudly as the packs are strapped to their backs. There is the rattle of regimental drums, the clear call of the bugle, or the strains of "Partant pour la Syrie."

In walking one day to an Arab village at a distant end of the oasis, we chanced upon a group of Arab girls bathing in a pool, partly screened by lustrous green foliage. They were splashing and playing like ducks, their limbs glistering, their dark hair streaming. Of a second, our approach was seen. That a man—there chanced to be one in our party—should gaze upon their unveiled faces, covered though they might be to their chins in water, was an event to be avoided. There was a short succession of screams, a glimpse of bare feet and bare young bodies as they scampered away, with their burnouses wrapped about their heads, for the faces must be hidden, of course!

Murray says: "The street of the Ouled-Naïls, with its café and oriental dancers, is a place where no European woman should go." Murray failed to taboo the American woman's sightseeing in this Biskran tenderloin. I wonder why? At all events, being children of our grandmother Eve, we wished to go. In Algiers we had managed to escape from the Spanish courier whom we had had—to speak correctly, he had had us—and, being two lone women, sought in our perplexity as to a chaperon for the café the advice of that useful gentleman, the hotel concièrge, who is alike consul, valet-de-place, and interpreter in one. In this particular instance he was a blonde and soldierly German from the Rhineland, always courteous and fatherly, speaking French, German, Italian, English, and Arabic in as many minutes, and equally at home in each. He assured us that we might safely go to the street of the Ouled-Naïls and the café, and that as our escort he would send a French-speaking Arab servant from the hotel; we were cautioned to leave our money at home, giving to Mahamed, the aforesaid Arab, sufficient silver for use.

There was a mysterious charm in the quiet night as we followed the white figure of Mahamed and the light of his curious old lantern. Other white-robed figures passed or met us, and once or twice the *"Allah yahmahnik"* (God be with you) of a friend greeted our guide. The stars were intensely bright overhead, and the briskness, purity, and sweetness of the air too delicious to describe. Passing into the street of the Ouled-Naïls was a sudden transition to much life, color, and noise, the street itself full of Arabs, young and old, while on matting outside nearly every door sat the Ouled-Naïl girls, drinking coffee, smoking cigarettes, and chattering what was presumably Biskran slang at any halting passers-by.

The Ouled-Naïls, sometimes called Almées, are girls from an oasis at some distance from Biskra, and of mixed Arabian and negro blood. They are more remarkable for their singularity of costume and grace of dancing than for the rigidity of their morals. Their faces are daubed with tar and saffron to accentuate the color of the Afric sun; tattooing in blue is quite la mode, and their hair, mixed with wool and stiffened with grease and tar, hangs in ebon loops about the face. They wear loose gowns of bright cotton, and gold and silver coin, coral, and filagree in barbaric abundance, sometimes twenty pounds of silver being carried in the shape of bangles, anklets, chains, and massive girdles.

From a brightly lighted, low, white building came the discordant music of reed instruments and the tom-tom of harsh drums, and thither we followed Mahamed. The little place was quite filled, a space in the center being reserved for the dancers. In one corner was a little stone furnace, and here an Arab, wearing the turban which denotes a pilgrimage to Mecca accomplished, cooked and served Arabian coffee, the aroma filling the room. What a picture it was, the bright fire and its reflections on the gleaming copper of the tiny coffeepots, the bronze faces under the crimson

A CANYON IN THE OUTSKIRTS OF BISKRA

IN THE PALM GARDENS: BISKRA

GOSSIPING ON A STREET CORNER: BISKRA

THE HORSELESS PLOW

THE ROADS ABOUT BISKRA HAVE A BIBLICAL ATMOSPHERE

OUTSIDE A CAFÉ: BISKRA

A REST BEFORE THE DESERT JOURNEY

A TYPICAL BARBER SHOP: THE OPEN STREET

AN OULED-NAIL: BISKRA (SEE PAGE 570)

STREET SCENE IN BISKRA

AN OULED-NAIL

A SELLER OF BREAD

DANCING GIRLS: BISKRA

A HAPPY FAMILY: BISKRA

A WAR LORD OF THE DESERT

RAPID TRANSIT IS NOT ESSENTIAL IN BISKRA

A STREET CROWD: BISKRA

THE MARKET PLACE: BISKRA

PLAYING MARBLES: BISKRA

A TEACHER ADMINISTERING DISCIPLINE TO A PUPIL BY RAPPING HIS HANDS: BISKRA

GATHERING THE DATES

fezzes, the white draperies contrasting with the gay gowns of the Ouled-Naïls. Four other visitors, likewise with Arabs from the hotel, had come to see the dance, and as two of them were unmistakably English women, they had as unmistakably disobeyed Mr. Murray.

Places were made for us on a bench beside some Arabs. Mahamed brought coffee to us, the orchestra redoubled its weird, monotonous, doleful music, and the dancing commenced. Slow it was, at first, and accompanied by much waving of scarfs, a sort of bolero; then it grew more animated and suggestive, until the girls, breathless and nearly exhausted, crouched in front of the orchestra, and two more took their places. As soon as the first dancers had recovered a bit of breath they walked about, stopping in front of each group for expression of appreciation in the shape of coin of the realm. Mahamed gave me two pieces to stick on the foreheads of the ladies, for such is the fashion of payment. Concerning the dance itself, I refrain from detailed description. It was the *danse du ventre*, or muscle-dance of the Orient, a modified form of which was shown in the Cario street of the Midway. It was a bit suggestive and more than a bit risqué.

Six kilometers from Biskra, under the shadows of Djebel-bou-Ghazal, are the marvelous hot springs of Hamman Salahin, the "Bath of the Saints." A tiny tram runs to it, out across the sands, and the place is curious to see. The water bursts out with great violence at the rate of forty liters a second and at a temperature of 112° Fahrenheit. There are baths for French and other visitors, and these are said to be very efficacious for rheumatism. Outside the baths the surplus water is collected in reservoirs for the Arabs to bathe; there is some superstition attached to the springs, and the natives plunge in and parboil themselves in the holy water.

If Biskra is the political and social center of the Ziban, and the Ziban is the group of prosperous oases, villages extending from the foot of the Aures Mountains to the Chott-Melghir, the religious capital is Sidi-Okba. Sidi-Okba is an oasis distant twenty kilometers from Biskra, and is named for that old warrior who, at the head of a small body of Arab cavalry, went forth to conquer Africa in the sixtieth year of the Hedjira. When he had extended his conquest from Egypt to Tangier, he spurred his horse into the Atlantic, declaring that only such a barrier could prevent him from forcing every nation beyond it who knew not God to worship Him only or die. In a revolt of the Berbers he was killed, A. D. 641, and when the Arabs had reconquered the Ziban their leader was buriéd in the oasis which bears his name.

The track across the desert to Sidi-Okba is practical for carriages, and our turbaned driver galloped his three horses harnessed abreast over the hummocks of sand and tufts of sage-brush till we begged for slower pace. Soon after leaving Biskra we crossed a stony tract a quarter of a mile broad, with a deep stream in the center, the Oued-Biskra, and emerged on the desert. The tiny oasis of Feliah is passed on the right, the dome of a Marabout's tomb shining among its trees. The long, low-lying line of the palms of Sidi-Okba is in the distance; the Aures Mountains rise in golden and rose glory, the deep clefts in their side blue and mysterious.

Groups of Bedouin tents are passed at intervals, and the scarlet rug, the copper pan, the fire, and its group are dashes of bright color in the yellow-browns of earth and camp, canopied always with the dazzling blue of the sky. Herds of camels feed on the dry sage-brush of the plain, and the baby camels trot by their mothers in coltish fashion.

Occasionally three or four little fellows dart from the camps as we pass, and run nimbly by the side of the carriage. "Sontie, Sontie," they call, and stretch out pleading hands. Centimes, to be sure, are what they ask, and when we throw out some sous there is a diving of little black polls, a scramble, and a fresh sprint. Having no clothes, they could

A RIVULET OF MUDDY WATER WHICH FLOWS THROUGH THE MAIN STREET OF SIDI-OKBA

have no pockets, and the money went into their mouths.

Five other oases are passed, Chetnah, Droh, Sidi-Khabil, Seriana, and Garta, and at length we approached the mud wall which surrounds the sacred oasis. Four thousand Arabs live in this village, and the mud houses are thickly packed, the streets narrow and indescribably dirty, with rivulets of muddy water running down the center. The tiny shops are open to the street, in Eastern fashion, and behind their wares the cross-legged merchants sit in stoic indifference. The most primitive of tools and of workmanship characterize the bazaars, and there is a lack of the attractive objects one sees in most oriental towns and shops, only the necessities of existence having place here.

Half-naked boys play a game with sticks and ball, hockey, perhaps—or, stay, can it be an Arabian form of golf? Perhaps that quick cry means "fore" in the Arabian tongue. Who knows? Heads of veiled women peer out behind the screen of a hanging blanket in the back of a shop, and an Arab, somewhat cleaner than any we have yet seen, accosts us in fair French, assuring us he is the only person in the oasis who speaks other than Arabic, and offering his services as cicerone.

A short and decisive bargain, and we follow our guide, followed in our turn by what seems half the population of the village, to whom we appear to be something in the nature of "freaks." Immediately behind us three lank fellows in torn brown burnouses brandish long bamboo rods to keep the curious populace from too near approach.

Through tortuous, winding streets we reach the square old mosque, built of mud and plaster, and said to be the most ancient Mohammedan building in Africa. It is a place of pilgrimage for the faithful, this tomb of a saint, and there are at least a hundred devotees at prayer in the place. Rags are tied over our Christian feet, and we follow our guide into the dark old mosque. Quiet it is and still, though just at the entrance a group of ascetic-looking fellows, Mohammedan "divinity students," are loudly repeating prayers from old tablets, swaying to and fro on their knees as they chant their supplications. But within quiet reigns, and the kneeling or prostrate pilgrims do not move as we creep softly by. The flat roof is upheld by rude columns, one of which, with its spiral ornamentations, suggests that its first use was probably in some Roman building. The moslem "half-orange," though ruder here than in the delicate alabaster of the Alhambra, arches over, with its seat for the Mufti on the eastern side, and beside it is a carved door of fine workmanship.

The shrine of Sidi-Okba is in a sort of chantry screened off from the mosque, and is of the common Marabout shape. It is hung round with ostrich eggs, chains and amulets of silver and copper, and, what appears to be particularly precious, a large gilt mirror frame. On a near pillar is a rude inscription in quaint Arabic, or Cufic, said to be the oldest Arabic inscription extant, and grand in its simplicity: "This is the tomb of Okba, son of Nafa. May God have mercy upon him." The minaret is said, according to Arab legends, to tremble visibly when the saint is invoked according to a prescribed form. But, though it is leaning and insecure, we felt no tremble as we ascended the high, winding stairs. Emerging upon the roof, the fascination of the sudden apparition of the Saharan scene held us fast. The level desert stretched before us, a golden sea of sand, the dark islands of distant oases recalling the simile of the panther's skin. Grander far is it than the surface of the ocean without a sail, the far-off line where earth and sky melt into one suggestive of distance, mystery, and unknown existence, that "dry country abounding in dates."

The flat roofs of the village surrounded us, and many a veiled woman's figure, swaying and bowing with monotonous genuflection, reminded us that the feminine faithful resort to the housetops to pray.

Across the sand dunes and by the

Bedouin camps, where no doubt "fair Zuleika awaits in her tent," we gallop back to Biskra, the apathetic "ships of the desert" scarcely looking up from the sage-brush as we pass. With eyes trained to peer for big game in American forests, the writer looked in vain for gazelles or ostriches, each moving speck on nearer view always proving a camel. But gazelles and ostriches do abound, says the Arab, and also at some seasons the *serpent à corne,* whose bite is said to be fatal, though these last are seldom found near Biskra. Dried ones, souvenirs of what one did not see, may be purchased for a franc, and seem rather more desirable than the live variety.

A story is told of an Englishman who was "doing" the desert, and who wished to protect his legs against the reptiles. He provided himself with tin boot-legs, and a pair are shown to travelers; but a delicious doubt exists as to whether the Englishman left them or whether they are all that is left of the Englishman.

Beautiful Biskra with her crown of palms rises before us in the sunset as we approach. The grace, lightness, and yet the suggestive strength of the wonderful trees is difficult to describe; the glow of sunset on the stems, the shadows of the sharp-pointed leaves, all need a subtler pen than mine. The sands are dyed deep purple now, with high lights of brilliant rose, and over the Sahara bends the evening sky, its blue blending into saffron and green, washed thinly with streaks of crimson. Until one has seen the sun go down over the African desert one can never conceive what brightness of color Nature carries on her palette.

The clear musical tenor of the muezzin's call floats from the minaret of the Biskran mosque:

> "Come to prayer, come to prayer;
> It is better to pray than to sleep;"

and looking eastward the faithful fall prostrate. *"Allah il Allah"* (God is great) is the substance of their psalm of praise, and the motionless figures and the solemnity of the scene are beautiful in their suggestiveness. What though the heaven prayed for and the prophet worshiped seem unorthodox, there is faith, devotion, and adoration. It is an honest, earnest faith, be it right or wrong, a religion of duty and of following to the letter the law laid down by Mahomet. Even though on deliberate examination the whole system of Mohammedanism does break down, one must admit that the fervor is sincere. With the desert for their temple, their altar-fire the setting sun, their faces toward Mecca, and their hearts toward Allah, their every attitude breathes faith and devotion. Benighted they are, and unregenerate, but earnest, nature-loving, and sincere wherever the Goum surrounds the tri-colored standard of the Prophet.

BÉDOUIN ENCAMPMENTS PASSED ON THE ROAD FROM BISKRA TO SIDI-OKBA

THE FOURTH POSTURE OF THE DEVOUT MUSSULMAN AT PRAYER

HE BOWS TO THE GROUND THREE TIMES, MURMURING "I EXTOL THE SANCTITY OF THE MOST HIGH"

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Weight, 7½ pounds; grown in the State of Tamaulipas, Mexico. Photo from Mr Russell H. Millward, American Vice Consul, Tampico, Mexico

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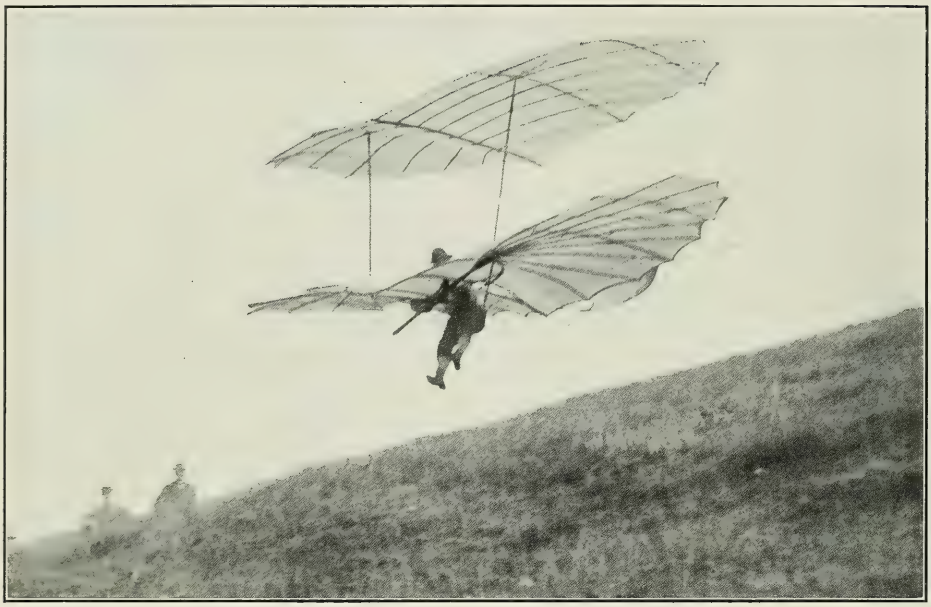
QAHATIKA WATER GIRL



REMARKABLE PHOTOGRAPH OF LILIENTAL'S GLIDING MACHINE

THE enclosed photograph of Lilienthal's double-decked machine was among the last ever taken of him, I think, for I secured it only two or three days before he was killed in the same machine, at the same place—Neustadt an der Dosse.

I knew Lilienthal quite well, and made one or two short glides with this same machine, the last time we went out together. It struck me as being very unstable (in my hands), though Lilienthal managed it with great skill, rushing along at race-horse speed, 60 or 70 feet in the air, the wind playing extraordinary æolian harp music on the steel piano wires with which the framework was trussed. What impressed me most was the tremendous amount of athletic work necessary to balance the machine. He was never still a moment, swinging his legs from side to side, and on landing was always quite out of breath, though I doubt if he was in the air over thirty seconds. It seemed to require as much exertion as a hundred-yard dash.

R. W. WOOD.

Johns Hopkins University, Baltimore, Md.

LOCATION OF THE SIR JOHN FRANKLIN MONUMENT

Editor NATIONAL GEOGRAPHIC MAGAZINE,
Hubbard Memorial Hall, Washington, D. C.

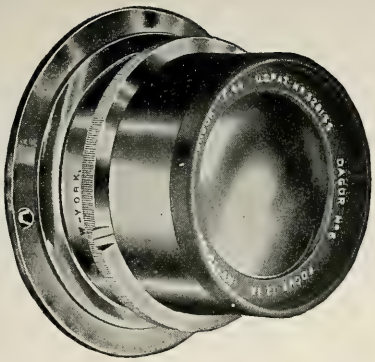
DEAR SIR: I note in the January number of the Magazine, page 67, picture of the Sir John Franklin monument, which is stated to have been "erected on King Williams Island, where the relics of his party were found."

This monument was erected, not on King Williams Island, as stated, but on Beechey Island, where the ill-fated expedition wintered in 1845–1846. The picture shows a marble slab lying on the flagged base. This is the marble tablet which was sent out by Lady Franklin in the United States expedition of 1855, under Captain Hartstein, for the purpose of being erected at Beechey Island. Circumstances prevented the Americans executing this kindly service, and it was the lot of Captain McClintock to convey it from Godhaven, Greenland, to the site originally intended. The tablet was constructed in New York, under the direction of Mr Grinnell, at the request of Lady Franklin, in order that the only opportunity which then offered of sending it to the Arctic regions might not be lost. In 1906 Captain Bernier, commanding the Canadian government steamship *Arctic* (formerly the *Gauss*), built up the concrete base and embedded this tablet therein.

The small marble tablet on the face of the monument was erected to the memory of the gallant Lieutenant Bellot (McClintock's "Fate of Sir John Franklin," page 173).

Yours truly,

JAMES WHITE,
Geographer.



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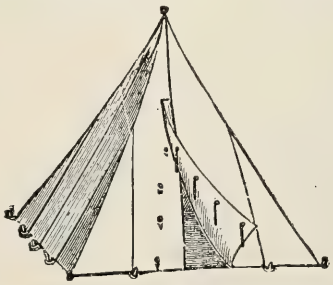

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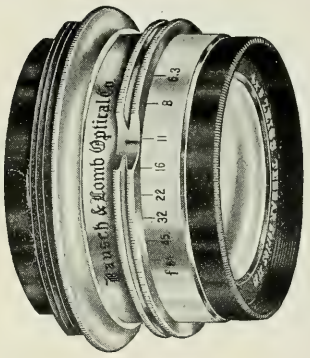

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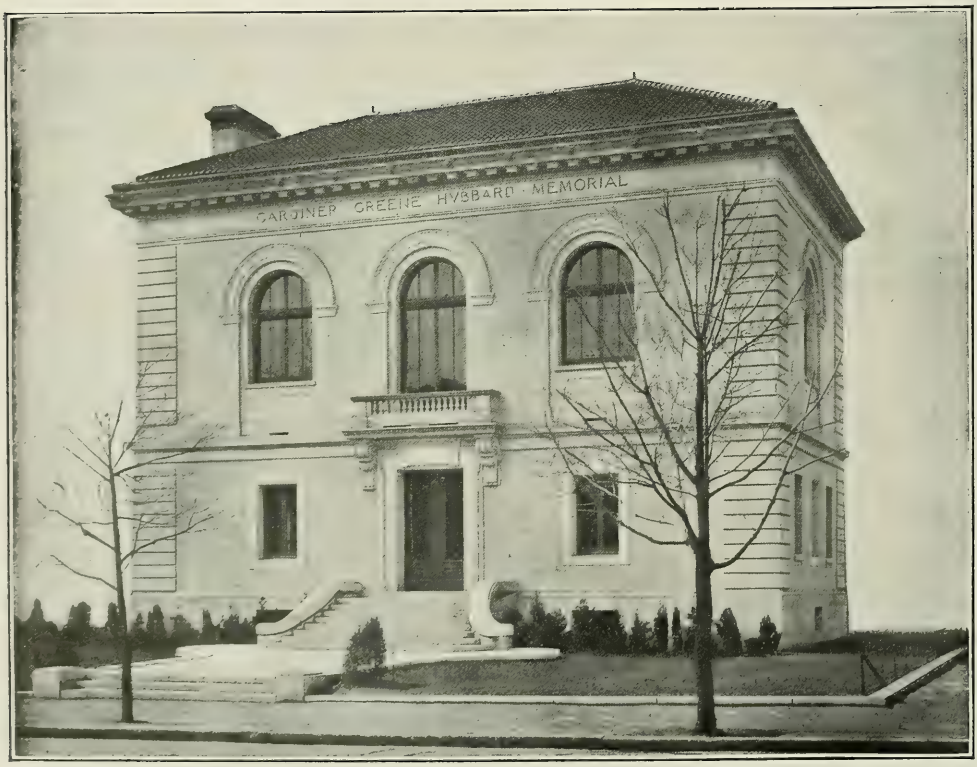

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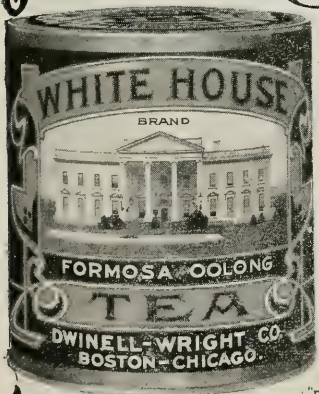

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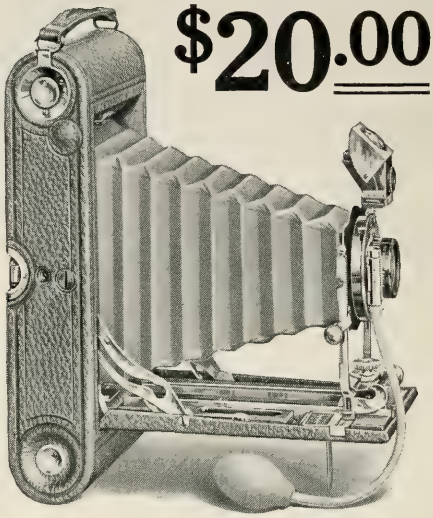

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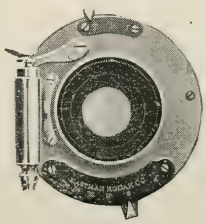

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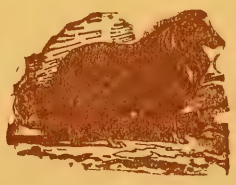

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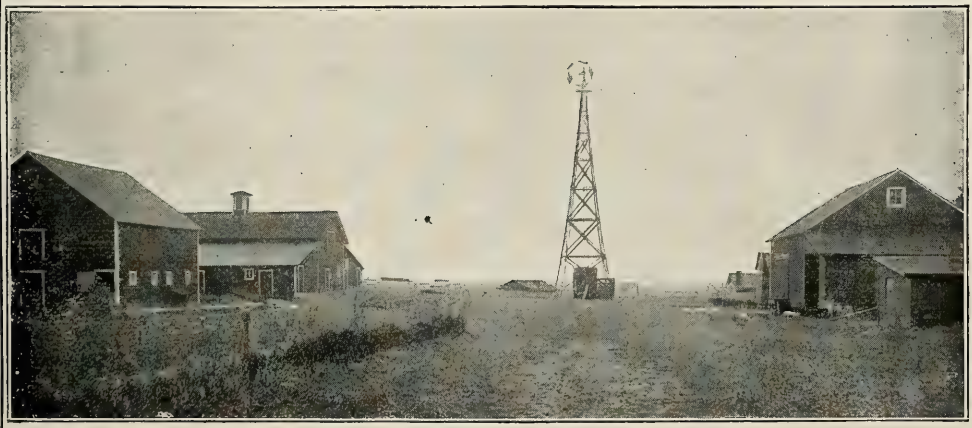

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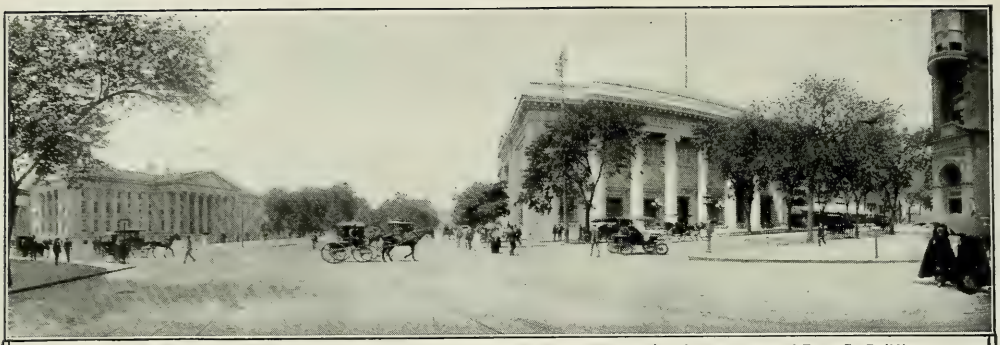

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THE NATIONAL GEOGRAPHIC MAGAZINE

SOME WONDERFUL SIGHTS IN THE ANDEAN HIGHLANDS

The Oldest City in America. Sailing on the Lake of the Clouds: The Yosemite of Peru

BY HARRIET CHALMERS ADAMS

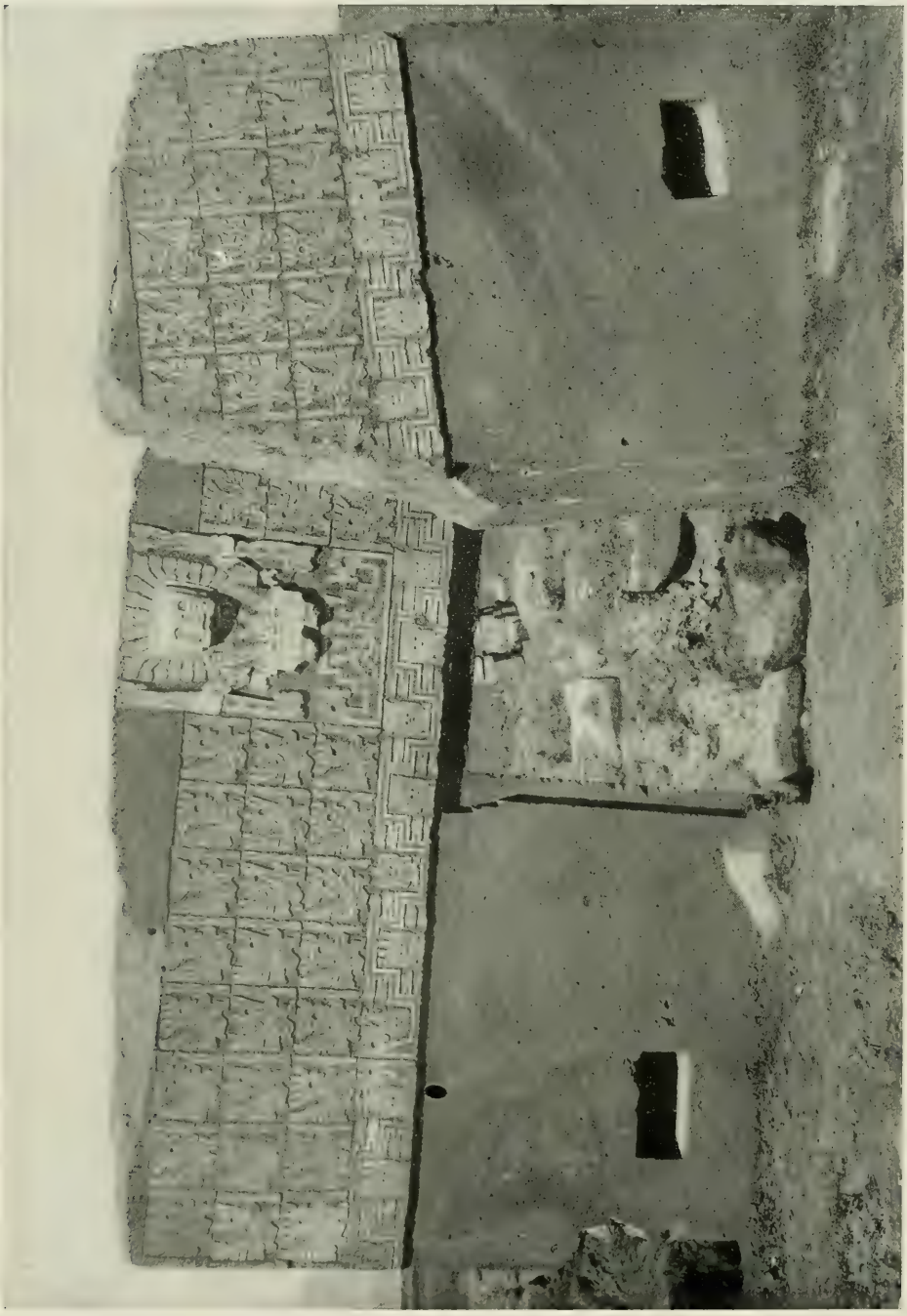
With photographs by the author

AS the train steamed away, leaving us in the little Andean village of thatched mud huts, I pinched myself to make sure I was awake. We were in Tiahuanaco, an Indian hamlet, situated on that bleak upland plain of Bolivia which the traveler must cross to reach La Paz, the capital. From Lake Titicaca we had journeyed in a modern railway coach, but with the departure of the train seemed to have dropped back five hundred years. "No trace here of Spanish invasion," I said; but just then we came upon a street shrine and a stone cross, and were reminded that these highland Indians are no longer sun-worshipers.

Passing through the village, we reached the ruins of Tiahuanaco, pre-Incasic—"beyond the reach of history and tradition" even in those days when the ancient Inca Fortress of Sacsahuaman was erected on a hill overlooking Cuzco. These ruins mark the site of the oldest city in the New World, and from under the drifting sand of centuries a civilization still more remote than that of Tiahuanaco may yet be brought to light on the Andean plateau.

Tiahuanaco is in the very heart of the region known as the Tibet of the Western World. It lies on a plain which is over twelve thousand feet above the level of the sea, a plain from which rises the lofty *Cordillera,* the third and great range of the Andes. Journeying eastward from Lake Titicaca, we crossed an open, unprotected country, wind-swept, barren. The thatched villages and adobe-walled corrals looked as dreary and colorless as the desolate *Puna* itself. Yet here, archæologists tell us, flourished the most advanced of the ancient American civilizations.

In the Tiahuanaco of today beautifully cut stones brought from the near-by ruins form a part of the church built by the early Spaniards. To neighboring vil-



A DOORWAY CARVED OUT OF A SINGLE BLOCK OF STONE IN THE PRE-INCASIC TEMPLE AT TIAHUANACO, PERU
(SEE PAGE 599)

lages, and even as far as to La Paz, the capital, these great stones were carried to be used as foundations of churches erected in the faith of the conquerors.

The ruins lie on a level part of the plain where the soil is firm and dry. They consist of rows of stones, sections of foundations, carved doorways, portions of stairways, vast masses of rock, but partially hewn. No mortar was used in the construction, yet these stones were so skillfully cut and fitted that the foundations have outlived the centuries. They are of red sandstone, slate-colored trachyte, and dark basalt transported from quarries many miles away. Later, in the ancient Peruvian fortresses, we saw wonderfully cut and massive stones, but none with the carved ornamentation found here.

The most remarkable monument is the monolithic gateway which, although broken at the time of our visit three years ago, was still standing. A friend who visited the ruins last year tells me that the Mighty is now fallen. As we saw it, a doorway about four and a half feet high and two and a half feet wide was cut out of a great block of stone over seven feet high, thirteen feet wide, and eighteen inches thick. (See illustration on page 598.) Above the doorway, four rows of carving, a central figure sculptured in high relief. It is claimed by students of antiquity that no better piece of stone-cutting exists. The figures in the rows of carving have human bodies, feet, and hands, but are winged, and some have the heads of condors; others, with human heads, wear crowns and carry scepters. All of these smaller figures seem to be kneeling in worship of the large raised figure, which also is crowned and sceptered, and decorated with the heads of condors and tigers, symbolic of strength and power.

As I gazed on this quaint doorway, unique on this continent, a picture came to me of the metropolis which it once graced. The massive wall of which it formed a part rose before me, a wall surrounding a populous city, contemporaneous with the ancient capitals of

IN THE RUINS OF THE OLDEST CITY IN THE NEW WORLD, TIAHUANACO

Egypt and the East. I did not feel as confident of our triumphant modern civilization as I stood in the shadow of this hoary gateway. "History repeats itself," the thought came to me; "civilizations rise and fall." Which of the mighty edifices now standing in America will testify to our nation's greatness in the centuries to come?

I still felt that we were linked with the past as we walked back to the village of Tiahuanaco. In fact, throughout the Andean highlands the traveler feels transported to centuries gone by. The coast cities of Peru are progressing rapidly; in Lima one can now live quite as comfortably as in New York. In the uplands, however, wander a bit off the beaten path and there are only the village

RUINS OF THE TEMPLE, TIAHUANACO

church towers to remind one of the years that have passed since Pizarro sailed south from Panamá. The mountaineers of Peru are still, in greater part, full-blooded *Quichuas,* descendants of the Inca tribes. After crossing Lake Titicaca, we found the *Aymarás,* descendants of a people conquered by the Incas shortly before the coming of the Spaniards.

In the Andean country the head-dress changes with the locality. In Tiahuanaco the belles exhibit a remarkable headgear, reminding me of that worn by pictured, top-heavy, ill-fated British queens. The hat consists of a stiff, coffin-shaped piece of pasteboard covered with red or blue cloth and tinsel; hung around this is a deep valance as a protection from sun and wind.

The men here are not to be outdone, and on feast days come forth in head covering that would put even this season's "Merry Widows" to shame. Multicolored macaw feathers, colored cloth, and tinsel combine to dazzle the beholder, and as the revelers march down the village street, blowing on reed pipes and beating drums, they are accompanied by a score of half-naked children and a few dozen barking dogs. The children are always dirt-covered, the dogs always lean and savage, and the players always imbibe too freely of *chicha,* ending the day in a drunken carouse. I always worried about the hats, fearing they wouldn't be in good condition for the next feast day.

It is bitterly cold in Tiahuanaco, but the natives, both men and women, are scantily clad, and go bare-legged. They believe in keeping the head warm, however, and tie bands of cloth, woven from llama wool, over their hair underneath

WOMEN OF THE TIAHUANACO OF TODAY

THE VILLAGE BAND, TIAHUANACO

GAUDY HATS WORN BY THE MEN OF TIAHUANACO AT FIESTAS (SEE PAGE 600)

their hats. They sleep on the ground in unfurnished huts, and live principally on *chuño*, the frozen potato, and *cholona*, dried goat or mutton. As we returned to Lake Titicaca, we looked out on the highway which parallels the railroad, and saw Aymarás driving their llama trains and laden burros. In the fields were the shepherds, often mere lads, playing on reed pipes as they watched their flocks of sheep, goats, or alpacas. Glorifying the dreary landscape, the *Cordillera de los Andes* towered to the northward, the jagged peaks of Illampu rising to twenty-three thousand feet above the sea.

THE LAKE OF THE CLOUDS

Lake Titicaca is in many respects the most extraordinary body of water in the world. It is the highest lake on earth which is steam navigated, and the grandeur of the mountains which surround it and the romantic legends which encircle it combine to make this Lake of the Clouds most interesting to the traveler. In shape it is long and irregular; its extreme length is one hundred and twenty miles; its width sixty miles, and its elevation twelve thousand five hundred feet above the sea. The lake is of great depth and never freezes over, although ice forms in places near the shore where the water is shallow.

In color it is dark blue, shimmering in the sunlight, and its brown islands look like a topaz necklace on a sapphire-colored gown. Titicaca is a border lake between Peru and Bolivia, and it is on the Bolivian shore that the Andes sweep in a crescent across the horizon. Illampu, or Sorata, is the most majestic of the peaks, but in crossing the lake we saw an uninterrupted chain of mighty *nevados* stretching from Illampu to the graceful Illimani, the beautiful White Lady which overlooks the picturesque city of La Paz.

Of the eight large islands in the lake, Titicaca and Coati are the most historic. To the ancient Peruvians they were sacred islands in the worship of the sun and the moon. To Titicaca, Island of the Sun, the Peruvians traced their origin—the same Adam and Eve story which we find the world over. From Titicaca the first Inca and his wife—so runs the legend—started forth to the northwest to found Cuzco, Sacred City of the Sun. There are ruins on a number of the islands, and tombs of Inca chiefs near by on the mainland. The hillsides bordering the lake are barren, except for a few cultivated patches, but reeds and lake-weed form an emerald fringe around the shore. It is a pretty sight to see the cattle wading into the water to feed on the lake-weed, their principal food at a certain season of the year. The reeds are of great value to the natives, since out of them the *balsas* or lake boats are woven.

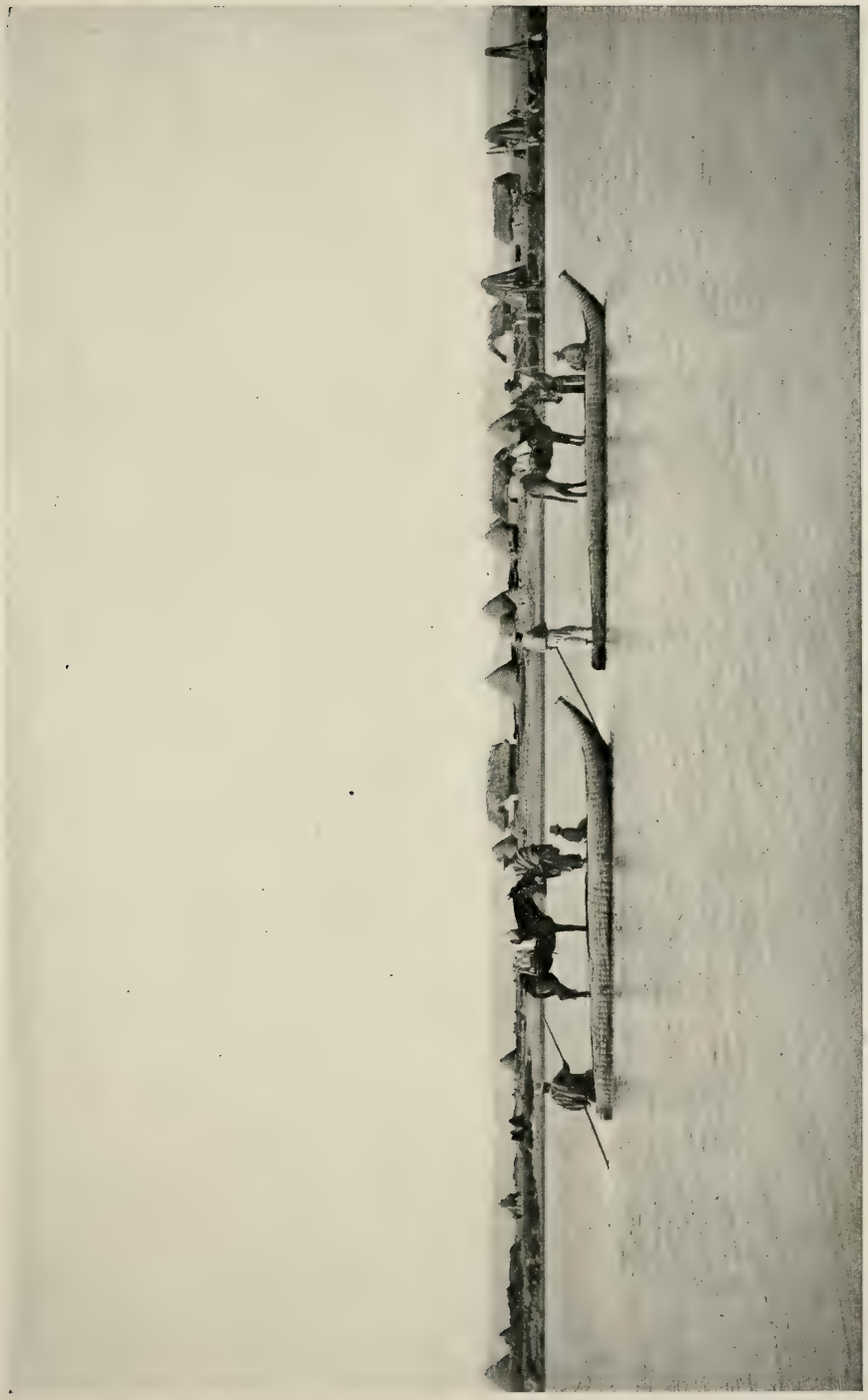
The rush balsa is the most picturesque feature of the landscape. The sail as well as the boat is built of woven reeds, and the balsa can be used for six months, when it becomes water-soaked, and must be abandoned. Sailing in this queer little craft proved an exciting pastime. The boat is simply a big basket made of bundles of grass tied together and shaped a little like a canoe. One is in danger of becoming very wet and very seasick. I decided that the boats are most attractive *when seen from the shore*. The Titicaca Indians wear homespun, as in years long past, and as I watched a fleet of balsas sailing out to the fishing grounds I realized that in the people, crafts, and lake itself there is little change since prehistoric days.

On our return to Peru from Bolivia we boarded a small steamer at Guaqui, and were a day crossing the lake to Puno. In the crossing to Bolivia we had been passengers on the *Cuyo*, a fairly comfortable little vessel, but on the return trip embarked on the *Yavari*, which certainly was built "when Columbus was a little boy." It was a rough and disagreeable voyage, and a number of passengers suffered from seasickness and from soroche. This mountain illness affects people differently. Some suffer from pain in the head, others from nausea, and the most dangerous form is heart failure. We escaped the trouble altogether, probably because we ascended

SAILING ON THE LAKE OF THE CLOUDS, 12,500 FEET
The boat and its sail are constructed of reeds

SKETCH MAP SHOWING LOCATION OF LAKE TITICACA AND ANDEAN HIGHLANDS

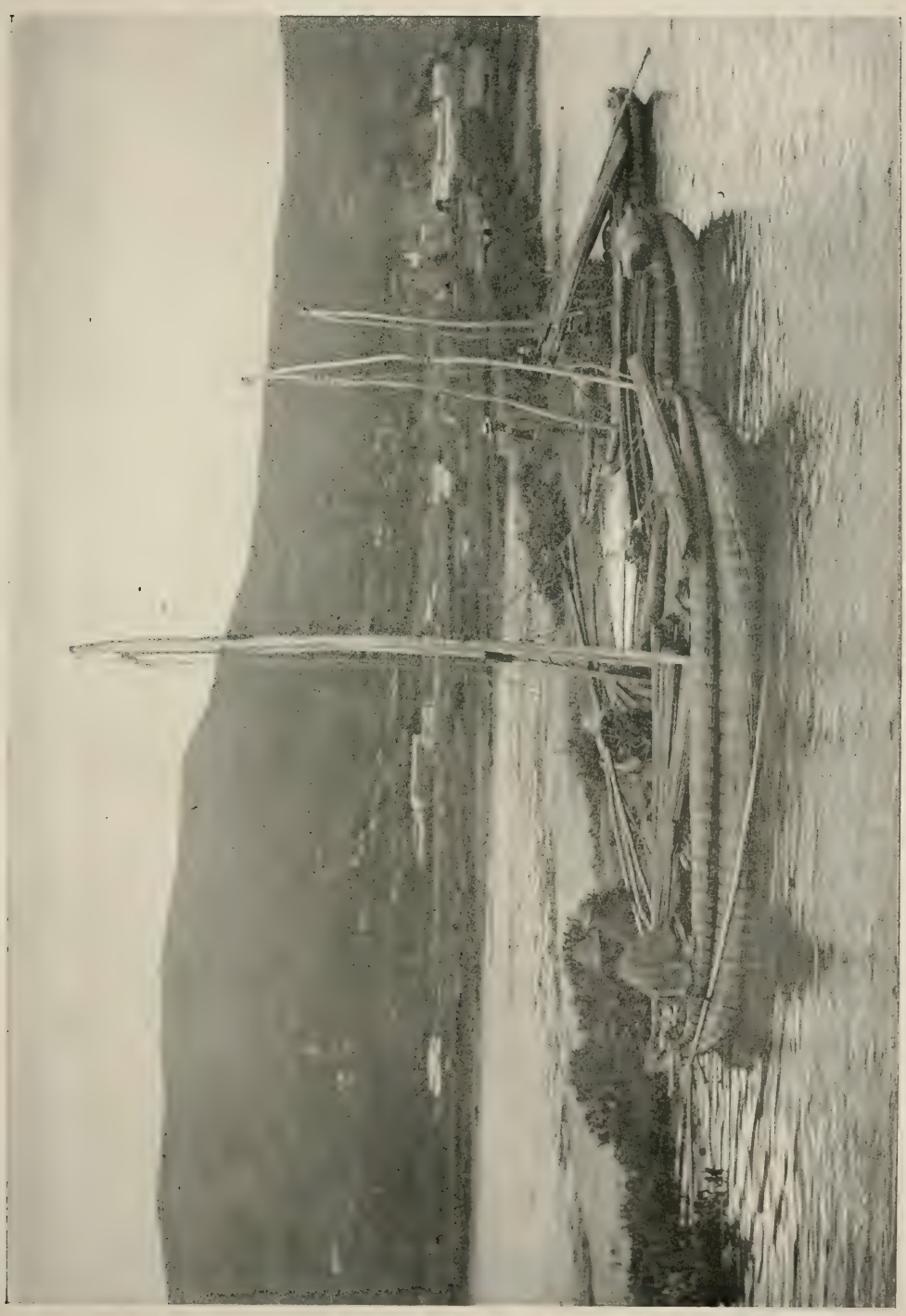
CONSTRUCTING A BALSA OF REEDS ON AN INLET OF LAKE TITICACA



FERRYING MULES IN THE REED BOATS

EMBARKING ON A BALSA

VIEW OF A PART OF THE DECK OF A BALSA



FERRYBOATS WAITING FOR A FARE, LAKE TITICACA

These reed boats last about six months and are then abandoned

to high altitudes gradually, first remaining a week at seven thousand feet, then stopping at twelve thousand, and finally reaching nineteen thousand two hundred feet without difficulty.

From Lake Titicaca we journeyed by rail to Sicuani, then the terminus of the road which is now well on to Cuzco; but when I visit Peru again, I shall journey once more by coach beyond Sicuani. By this method one can better study the life of the natives in this most romantic part of the Andean country. In a recent story* I told of our journey over the old Inca highway, and in the future will write of life in Cuzco, the ancient Mecca of the New World.†

"THE SWEETEST VALLEY IN PERU"

While in Cuzco we decided to make a journey to the Valley of Yucay, to visit the old fortresses of Ollantaytambo and Pisac. This is one of my most delightful memories of Andean travel. It was in the Valley of Yucay, "the sweetest valley in Peru," that the Incas are supposed to have built their summer palaces. We made this journey in the saddle, with only our blankets and saddle-bags, unhampered by guide or cargo mule. Starting out very early one June morning, we rode over the rocky streets of Cuzco, the city of all others in the Americas rich in its legends and history, its charming situation, and unpleasant odors. The road led up to a hilltop where we had a comprehensive view of the red-roofed town, with its many church towers and ancient plazas, overshadowed by the Fortress of Sacsahuaman, which looks down on the *bolsone*, the mountain valley, in which Cuzco lies. Facing in the opposite direction, we saw our trail leading to the Cordillera, the same snowy chain we had known as the Bolivian Andes. Now we were many miles to the north.

All day we traveled over the high plateau, at times on a trail, again over a portion which still remains of the Inca highway, formerly connecting Cuzco with Quito. The Inca road was formed of rough stones set into the ground, bordered by low stone walls, through which passages were cut at intervals to carry off the water. As between Sicuani and Cuzco, we met many pilgrims and llama trains, and now there were burros heavily laden with produce from the Valley of Yucay and from the more tropical valleys beyond. We had food in our saddle-bags, and went without water, observing that the passing brooks served for all village household purposes. In the late afternoon we reached Chinchero, where there are Inca ruins near a few dilapidated huts and an old Spanish chapel. Riding on, we faced the Andes, and were wondering where Yucay could be hidden, when we suddenly reached the edge of the plateau and saw the canyon-like valley four thousand feet below.

One who has stood on the heights overlooking the Yosemite Valley, in California, can form a mental picture of Yucay as seen from this elevated table land. Through the valley flows the River Yucay, which we had known above Cuzco as the Vilcanota, and which, farther on, as it flows to the king of rivers, is called the Ucayali. It is the longest formative branch of the Amazon. As in the Yosemite Valley, fertile banks mark the shores of the river, but instead of waterfalls the steep mountain walls of Yucay are covered in many places with graceful terraces of the ancients. Broad at the base, narrowing as they rise, these terraces are one thousand feet in height. So the Inca's subjects gained area for agriculture, irrigating by means of aqueducts which started at the verge of the snows.

Although the floor of the valley is elevated eight thousand feet above the sea, it is so sheltered that the climate is mild and delightful. The coast, sierras, and highlands of Peru are without rain or natural verdure. It is as though Nature gave her all to the forest-covered eastern slope of the Andes. It is only where rivers break through the mountain walls and cross the deserts that the barren country to the west of the Cordillera

*Published in the April, 1908, number of the NATIONAL GEOGRAPHIC MAGAZINE.
†To be published in an early number of this Magazine.

ON THE TRAIL TO THE VALLEY OF YUCAY, BORDERED BY SPANISH BROOM

THE VALLEY OF YUCAY

blooms. To travelers long on the bleak *Puna* the Valley of Yucay seems an enchanted vale.

As we descended from the heights of Chinchero by the steep, narrow, winding trail the wonderful scenery put me into an exalted mood. I was a Quichua princess carried by my willing slaves down to the beautiful summer palace of my father, the Inca; only just then my tired

horse stumbled, and I came back to earth a dusty little Andean traveler longing for any moth-eaten *posada* where I could rest my weary head.

We found the *posada* in the village of Urubamba—every other name ends in "bamba" or "tambo" in the Quichua country—and it broke all records for uncleanliness. It wasn't an expensive resort, however; we paid something like seventy cents for our bed, a day's board, and fodder for our animals. On the trails many of the natives speak only the Quichua tongue, but in Urubamba Spanish is spoken. There are a number of merchants in the village who buy the produce as it comes up from the Lower Yucay Valley and the tropical Valley of Santa Ana, sending it on to Cuzco and to other parts of the highlands. When the tired little burros jogged into town, I was always interested in their cargo. They brought coffee beans, cacao, coco-coca leaves, and tropical fruits. We saw few llamas in Yucay; the little mountain cousins of the camel are better suited to the highlands.

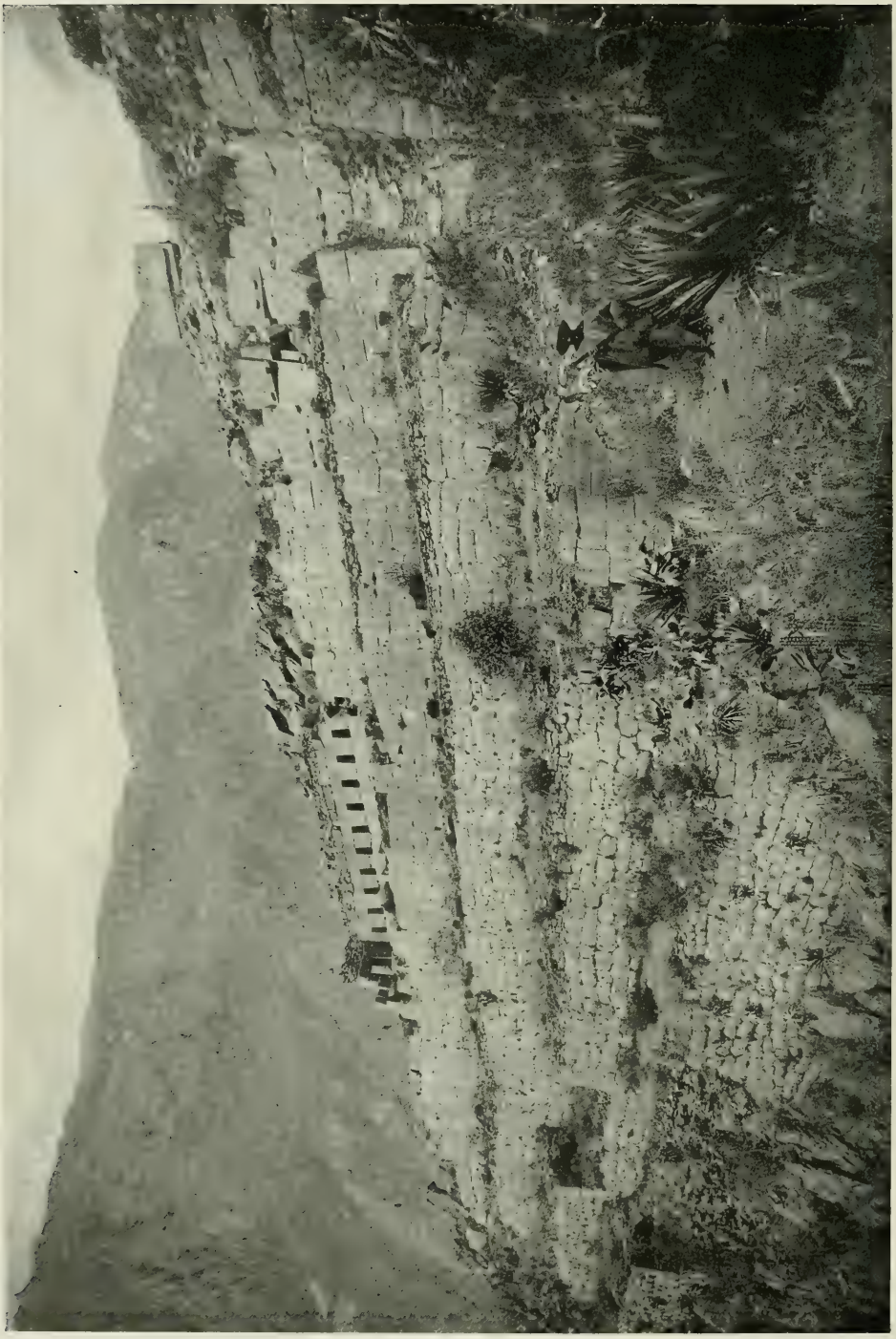
From Urubamba we rode down the valley over a trail which follows the winding river, a charming trail bordered by fragrant yellow Spanish broom and many varieties of the cactus plant, shaded by giant willows and pepper trees in ruddy blossom. Passing through peaceful villages, we came upon curving terraces and moss-hung ruins, but saw no remains of the wonderful summer palaces. I irreverently suggested that perhaps the Inca kings also yearned at times for "the simple life," and, leaving scepters and *llautus* behind, "camped out" in the restful Valley of Yucay.

Without palaces the ancients could exist, but not without fortresses, especially in this frontier country near the Andean passes leading to the vast forest which, in other days as now, was inhabited by savage tribes. A day's journey from Urubamba is the Fortress of Ollantaytambo, which guards the lower entrance of Yucay. A pretty legend is attached to the old place. Ollantay, a brave chieftain, was in love with the ruler's daughter, Cusi Coyllur, the Joyful Star. Ollantay was not of royal blood, and, being denied his lady love, made war against the Inca. He is said to have built this fortress, which he held for many years. The story ends in the good old way. At the death of the king the lovers were united, and lived happily forever after. In truth, the fort was built to safeguard the Inca's domain against the wild tribes of the *Montaña*.

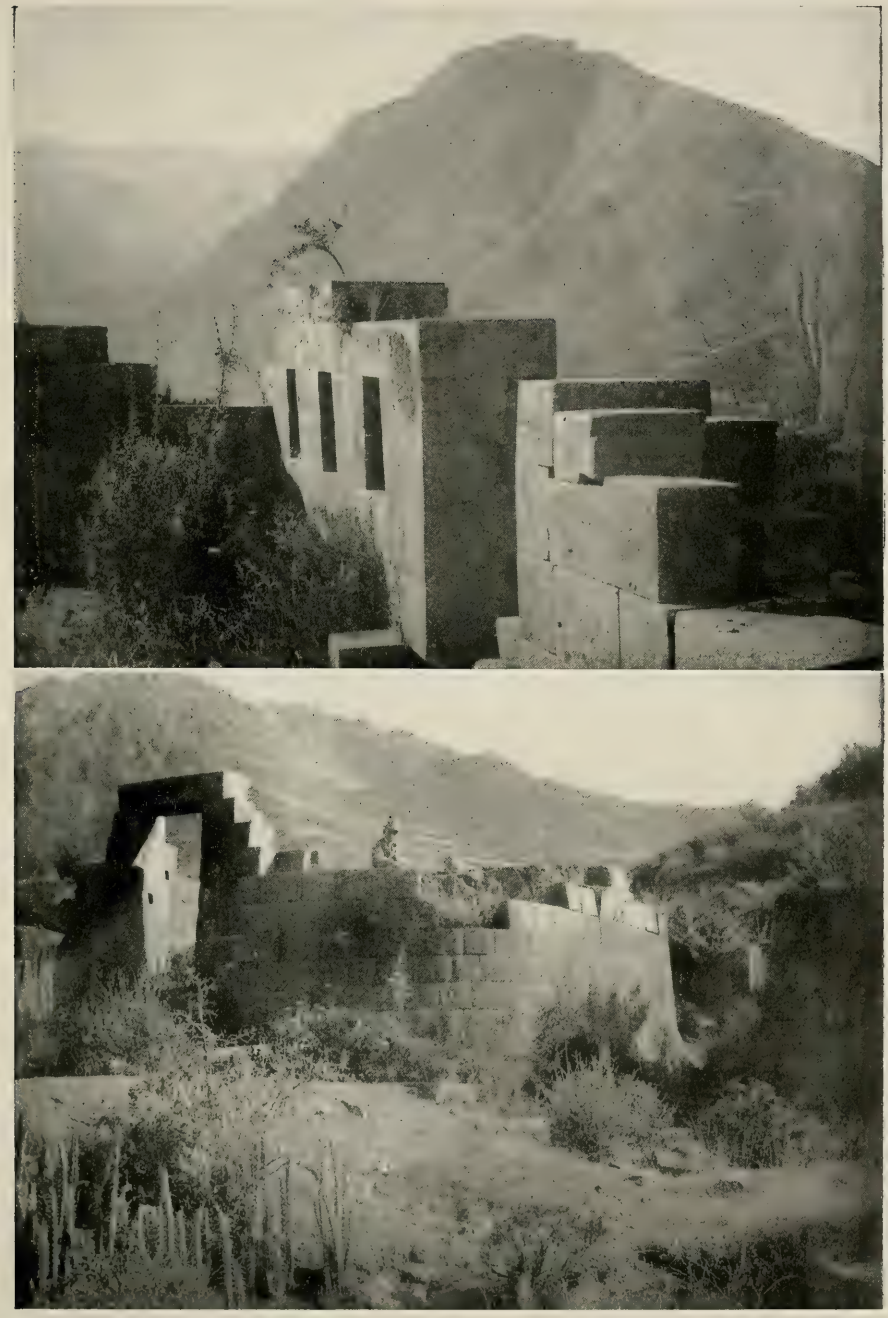
Ollantaytambo was erected on a spur of a mountain at the meeting place of the Yucay and Patacancha valleys. The outer walls of the fortress zigzag up the hillside, and on the summit are the remains of cyclopean walls, beautifully hewn doorways, niched corridors, and great slabs of porphyry supporting a terrace. There are six of these giant slabs in an upright position, and half way up the mountain side others weighing many tons, which fell by the wayside. These abandoned slabs are called "The Tired Stones."

With all other travelers who have seen the Inca fortifications, I have never ceased to marvel at these enormous rocks carried to great mountain heights from far-away quarries. I cannot content myself with the explanation given by a Yankee whom we met at a *posada* in Sicuani. Four of us, speaking English, brought up the old question, "How were the mighty stones carried great distances, to great heights?" and "Uncle Si" slapped his hand on his knee, hitched up his trousers, spat, and declared, "They done it with a yerb." Artificial stone mixed on the spot with a magic herb, I suppose he meant. Well, he was a wise old Yank! He was traveling around South America trying to sell a patent green paint to cover blackboards—a noble endeavor to save the eyesight of the little Latin Americans.

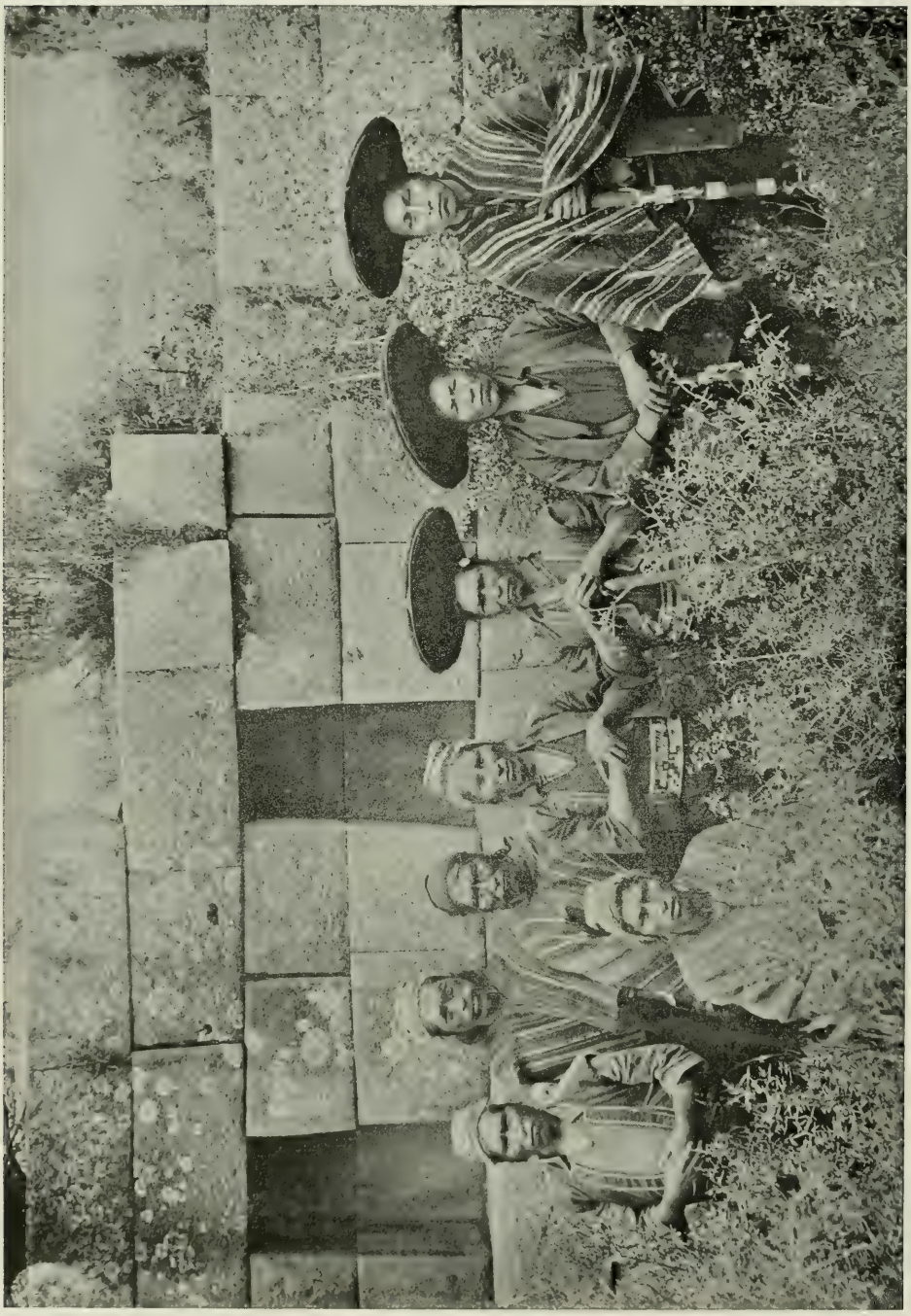
There is no posada in the village of Ollantaytambo. The Gobernador, chief magistrate, took us in, but he had no extra beds in his house, and we were obliged to sleep on the dining-room table. At the witching hour of three in the morning we were awakened by the



RUINS OF THE FORTRESS OF OLLANTAYTAMBO, IN THE VALLEY OF YUCAY (SEE PAGE 613)



RUINS OF THE FORTRESS OF PISAC. ASTRONOMICAL STONE, PISAC. IN THE VALLEY OF YUCAY (SEE PAGE 618)



TYPES SEEN IN THE VALLEY OF YUCAY, PERU

A FLOCK OF ALPACAS, SEEN IN THE VALLEY OF YUCAY

The Alpaca, unlike its cousin the Llama, is not a burden-bearer, being instead highly valued for its fine coat of woolly hair, the fiber of which is small but strong, very silky and lustrous. The unshorn coat reaches a length of about two feet, the annual shear, however, being only about eight inches.

crowing of roosters, and found that the pet fighting cocks of the family were tied to the table legs—the Peruvian alarm clock! In the early dawn we were on our way up the valley, and, passing Urubamba, rode on toward Pisac, the fortress which guards another mountain pass.

Before visiting Peru I had been impressed, in reading, with the monumental greatness of the Incas, but in the Upper Yucay Valley saw evidences of their agricultural and engineering skill as well. There are many terraces, aqueducts, well-planned fields, and the river has been straightened for miles from its serpentine course.

A number of the bridges spanning the river are of *mimbres*—woven branches fastened to cables with thongs of hide or vines. This makes a very picturesque bridge, but I have crossed rivers on safer ones. The mimbres, which we nicknamed "monkey bridges," are often lopsided and sway with the breeze. The question with us was whether to risk our lives in crossing the bridges or in fording the river.

Pisac is the most imposing of the fortresses. It is built on a mountain top, and looks down on the meeting of the Yucay and a lesser canyon which leads to the Paucartambo region, across the Andes. It is the most complete of the fortifications, has the most commanding situation, and contains a fairly well preserved temple built to hold the famous Inti-huatani, the astronomical stone. In the Quichua language, "Inti-huatana" means "where the sun's rays are gathered." Within the fortress are many agricultural terraces and aqueducts, an evidence that the garrison was not dependent on the valley below, but self-supporting in days of siege. Looking across the canyon we saw ancient tombs built high in the rocks, seeming accessible only to birds. In a quarry within the fort I found an instrument, a wedge of *chumpe,* the Peruvian bronze, left there by a Quichua workman many centuries ago. Comparatively few students or relic hunters visit Pisac, and we found a number of fine old *chica* jars in the village. From Pisac we crossed the Andes to the Paucartambo country, but "that's quite another story." Returning to the Yucay Valley some weeks later we reached Cuzco by a new trail.

Those were long days in the saddle, with little food and less water. We knew the river water to be impure, as the sewage of Cuzco flows into it, and the brooks are also contaminated as they pass through the villages. At night we slept on the ground, wrapped in our blankets, at times finding shelter in a ruined temple, as there are many lesser ruins throughout the Valley of Yucay. We met no travelers save the highland Indians, and picked up a few words of their tongue. I felt that we had left civilization far behind. Even the Spanish colonial days faded. We were in the old Peru.

To know a country and a people, one must leave the highway and live near to Nature. We traveled much in the saddle on this great elevated plateau—over a thousand miles on a single journey—and gradually my standpoint changed. I started as an outsider, having little real sympathy for the Quichuas and Aymarás, little understanding of the history and environment which has made them the sullen, lifeless folk they are. In time I grew, through study and observation, but more through sharing the life, half-Andean myself, and find, in looking back over years of travel in South America—years in which we visited every country—that my greatest heart interest lies in the highlands of Peru and Bolivia.

AS SEEN FROM A DUTCH WINDOW*

By James Howard Gore, Ph. D.

Professor of Mathematics, George Washington University

IN looking out upon the busy life of Holland, one does not look "through a glass darkly." If so, it is not because the window-glass is not clean. The fondness of the Dutch for window-washing is innate and of ancient origin. Guicciardini, who gave to the world in 1567 his graphic description of the low counties and their people, said the pleasure of walking along the streets of a Netherland town is marred by the danger one continually runs of being sprinkled by the pumps with which the servant girls wash the windows. But that was in the good old times of long ago. Now the servant girls do not wash the windows, at least not in the cities. Here the windows are attended to by a company—that is, one of many companies, for there are so many that they now add to their signs and business cards the date of organization.

When I first saw one of their carts loaded with ladders of various lengths and pushed by men dressed in white, I thought they were house-painters who had forgotten their brushes. But in a few days I saw one of these ladders deftly hoisted in front of my window, and before the thought of fire and rescue formed itself in my mind, a white-coated man was washing my window. He did it well and quickly. Quickly, of course, for the company received only two (Dutch) cents for that wash, and of that amount the workman has only a share. For this reason, and because of the lively competition, the carts of the "Glasenwascherij" companies flit rapidly from place to place. A householder subscribes for the services of these window-washers, securing a visit once a month or more frequently, if he desires, and pays two cents a window, large or small, first story or fifth.

In Holland, as well as in other parts of Europe, the method of subscribing for a service that is somewhat regular is quite common; and if you wish to provide for a contingency that may happen, but which you hope may not occur, you can protect yourself by insurance, be it the breaking of a window or an attack of whooping-cough.

My window is not only clean, but is provided with "spies," sometimes called "busy-bodies," as the outside mirrors are named. My battery of spies enables me to see at a glance what is transpiring up the street and down the street, as well as who is at the door, by merely sitting at the window.

The second house on the right is a public-school building, one part of which is the district police station, and now and then an image is caught in the mirror of some malefactor brought to judgment, attended by the usual crowd of curious idlers. It is a veritable judgment. The inspector at once has a preliminary hearing, a sort of grand-jury trial, and dismisses the prisoner, imposes the fine, or, if the charge be serious and well-founded, remands him for trial. Should the culprit be found guilty of some minor misdemeanor, a slight imprisonment is imposed. While great rigor is observed in seeing that the full time is spent in prison, the days of serving the sentence is optional, provided the offender is a man of property or can furnish adequate security.

One of the common offenses is the failure to observe the sign that is posted at the beginning of some of the streets: "It is forbidden to drive in here." In passing, it might be said that this forbidding notice does not signify, as some writers on Holland have asserted, that the leaning houses threatening to fall make the street dangerous. It simply means that the traffic is so great that

* By courtesy of the Holland-America Steamship Line.

vehicles cannot easily pass, and hence to avoid blockades all teams must go in the same direction.

It is unfortunate that people ignorant of the language of a country should undertake to enlighten others regarding the habits and customs of that country. The mythical cleanliness of the town of Broek owes its origin to the wrong translation of the simple sign on the bridge at the entrance to the town—"Stapfoets rijden." To those who know, it means "Walk your horse over the bridge." To the imaginative describer of this fabulous village it signified that here the streets are so clean that you cannot take your horse through the town, but must go around it. Broek is clean. So is every Dutch town.

Opposite my window is a letter-box, a two-storied one, the lower being for parcels, while the upper part is the receptacle for letters. It is just around the corner. All letter-boxes seem to be in nooks and corners, affording a convenient blind, behind which the servant girls read in safety the postal cards that were given them to mail. Postal cards are in great demand in Holland. A mistake in addressing one is not expensive, for an uncanceled postal card is redeemed for the value of the paper, while a spoiled envelope is hopelessly lost. There is nothing which so strikes terror to a Dutchman's heart as loss, and with the hope of gain he will venture much.

A HAPPY SOLUTION OF THE TRANSFER QUESTION

He—sometimes a she—will secure the permit and peddle postage stamps, calling at business houses at regular intervals to supply their demands for a commission of one-half of one per cent; he will stand at street corners and transfer stations and sell street-car tickets, receiving as his profits the difference between wholesale and retail prices. The car lines rather encourage this business. The hawkers frequently suggests the idea of riding, and travel has increased through their efforts. There was a custom in Amsterdam—possibly now in disuse since the electric company controls the transit system—of not giving transfers, but by paying an additional one-fourth fare the passenger would receive a coupon that would entitle him to a trip on any intersecting line or a return on the same line at any time during the day of issue. This was a happy solution of the transfer question.

The natural thrift of the Dutchman suggests many ways for making money. He is found in all of the recognized vocations and trades, every possible variety of trade and every imaginable differentiation thereof. It would be far easier to specify what he would not do for gain. The catalogue would be: Change his religion, cheat, and give up smoking. To stop smoking would be like giving up breathing. He smokes at all times and in all places—no, not quite all; never in church, though one writer at least has said so, and not in the marriage hall of the municipal building. Why should he not smoke? He enjoys it, and never interferes with any other person's enjoyment.

EVERY MALE SMOKES FROM INFANCY

I have been trying to find out at what age boys begin to smoke. It is one of the things that has attracted attention here since the genial Thackeray sketched the three small plump Dutch boys smoking their big cigars on the little Dutch steamer.

They all smoke cigars. The artists in the future, in depicting Dutch life, must omit the traditional pipe and substitute in its place the more prosaic cigar. But when do the boys begin? Nothing but death stops them. I have seen a father and his family of boys enjoy their smoke together, a youth in knickerbockers handling his cigar like a practical smoker, and boys on their way to the primary school doing full justice to a good-sized cigar.

But when do the boys begin? Perhaps it is with them as the lifting the dress is with the misses, it comes natural, and it is as difficult to point to the exact time for that as it is to specify when spring begins.

The streets of Holland are usually wet. When it is not raining, the street-cleaners are earning their wages, in part, by sprinkling them. Thus it is necessary for the ladies to lift their skirts in crossing, and as it is hard to tell just when the girl becomes a lady, the former gives herself the benefit of all doubt and begins in time.

The girl just in her teens clutches at her dress as soon as she feels the first rain drops or crosses a street, and the little tot, whose dress barely comes to her knees, tries to save her flounces. I have watched carefully, and so far I have not seen a girl old enough to leave the perambulator who was too small to imagine that her skirts might not be soiled by the wet. To pull the skirt aside, to give it a gentle lift, comes instinctively. So it is with the boy's smoking.

Between the letter-box and my window there passes a good part of Dutch life, and the little that is not in the procession is suggested by some counterpart.

Even history cannot be forgotten, for I look out upon streets whose names are taken from men who took part in the struggle for independence—a struggle that illumines the annals of northern Europe; a struggle that kept alive in adverse times the sacred fire of freedom. From this contest Spain was so weakened that the Armada was not invincible, and England escaped a defeat that would have given to the world's map a different set of boundary lines and would possibly have exterminated Protestantism.

THE NATIONAL CHARACTER REVEALED BY HISTORY

An uneqaul war like that waged by Holland against Philip of Spain would have resulted disastrously, had it not been for the national character of the people—a character that was in a large measure shaped by their geographic environment. Foreigners have invaded their land and swayed for a time its destinies, but their leaving was like the passing of a horrible nightmare—it left no influence upon life or habits.

When the Frisian vowed that his race should be free as long as the wind blows out of the clouds and the world stands, he thought of political freedom. But there is a destiny spelled out in the dikes and dunes that insures a grander freedom than immunity from serfdom—a freedom from the tainting taste for foreign foibles.

Since the land on which these people live is new, their history cannot be ancient, and with great definiteness it can be followed from the Batavia of Cæsar down to the Nederland of Wilhelmina.

We may begin with Charles the Great, who, mindful of his Brabant ancestry, left to the Batavians over whom he was called upon to rule their native customs and gave to them chiefs of their own nationality for rulers. This type of centralization was successful in the hands of a capable ruler, and the local chieftain vested with the title of deputy, count, or duke, answerable to the head of the state for his tribute money or his army, laid the foundations of Holland's greatness.

The dukes and the counts of the Netherlands were not slow in realizing that their wealth grew with the increased prosperity of their subjects, and encouraged them to gather into villages, and there, combining forces and capital, brought into existence manufactures of such excellence that the lowlands supplied the people of the neighboring countries with the products of mill and loom. These communities became little republics. They were made up of guilds recognized and protected by the authorities, since they contributed to the prosperity coveted by these authorities. In the course of time the guilds deputed delegates to meet in council, and their deliberations were passed on through representatives who, in assemblies, assisted in the general government. Thus the Netherlands became gradually familiar with government by representation.

These cities were not unfrequently quarrelsome and combative. Their horizons were bounded by the walls of their own towns, and the narrowing processes of such a pent-up existence brought about a certain intolerance toward one

another, but did not interfere with their united stand against a common foe.

Philip the Good obtained by inheritance the two provinces of Flanders and Artois; he purchased Namur; he usurped the Duchy of Brabant, and he dispossessed his cousin Jacqueline of Holland, Zealand, Hainault, and Friesland. His dominion extended from the foot of the Alps to the German Ocean, and comprised what was then the wealthiest part of northern Europe. The Netherlands at this time had reached the heights of its prosperity and the full enjoyment of its chartered liberties. The sovereign had his authority. The nobles had their place in the council; but the municipal authorities, though checked by these two forces, had a substantial influence over both.

In the assemblies of the estates the authority of the prince was, in his absence, represented by the *stadthouder*. When the Netherlands were united under one sovereign, the *stadthouder* became a permanent institution as well as a convenient substitute. When grants of money were asked, the nobles voted on the request. The cities, if they had received instructions to do so, bargained as to the grant; if not, they adjourned to consult their constituency. The ingrained habit of municipal isolation explains why the general liberties of the Netherlands were imperiled, why the larger part of the country was ultimately ruined, and why the war of independence was conducted with so much risk and difficulty, even in the face of the most serious perils.

We sympathize with William the Silent when he waited in feverish anxiety for the vote of funds sufficient to pay his needy soldiers, and applaud his patriotism when he sold his family silver to meet urgent demands. We are tempted to condemn as narrow and inefficient such insistence upon the prerogatives of local authorities. But when we see the beneficial results that come from our system of township, county, and state government, each independent of all others of its class and subservient to the type immediately higher, we give thanks that the system passed through the fires of the Dutch revolution and sustained the shock of civil strife.

SUCCESSFUL ROVERS OF THE DEEP

In another respect we see in the political fate of the Netherlands the effect of local conditions. Owing to the absence of nearly all kinds of winter food for animals, it was difficult to keep stock in good condition for slaughtering; thus the consumption of salted fish was enormous. The fisheries of the German Ocean became a mine of wealth and served as the nursery of the Dutch navy, of those amphibious mariners who struck the first blow for Dutch independence and became the ancestors of that succession of brave sea captains who crushed the maritime supremacy of Spain, founded the Batavian empire of Holland in the tropics, engaged in an unequal struggle with England, and sustained for a century the reputation of Holland after its real commercial greatness had declined.

Because of the clever skippers ever available and the demand for greater opportunities in which Dutch energy might display itself, voyages of discovery became popular, and for many years the Dutch flag claimed the farthest north and flew to the breezes in the south and distant east. Spitzbergen and Barentz Sea were of Dutch discovery, Van Dieman's Land originally belonged to Holland, and the Dutch East India Company for many years monopolized the Oriental trade.

Coming down to the present day, many of those who go down to the sea in ships are comforted to know, when the winds roar and the waves run high, that their vessel's crew are Dutch, and that there is in command the skillful, cautious Van der See, Bonjer, Potjer, or Roggeveen. "This is a hurricane," you may say. "A bit of a blow," is the reassuring reply of the captain. The ship will turn turtle, you think; "A slight roll," says he. Attentive to his duties, he has no time to be loquacious. He

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QUAINT COSTUMES OF VILLAGE GIRLS ON THE WHARF BESIDE THE FISHING BOATS, **ZUYDER ZEE**

claims no credit for smooth seas, nor declares any weather the worst. He is true to his trust and, knowing that he sails a N. A. S. M. ship, he is confident of a safe voyage.

The descendants of some of the old-time mariners to the icy North or to India's coral strand may now be poling a boat along the canal that crosses my street. Their ships are less ambitious, their journeys are not so romantic, and their cargoes may have less of value; but they are adding, each in his own way, to Holland's greatness. This greatness may be called dwarfed in its proportions, but Holland is truly great in her industry, perseverance, and in the spirit of her people. It is this spirit that dares to contest with the sea for supremacy as it dared the haughty Spaniard. It rests in the heart that never falters and lightens burdens that to others would be crushing.

THE WONDERFUL CANALS

This canal at my corner, whose busy traffic is reflected in my friendly mirror, is one of the many which divide Amsterdam into hundreds of trapezoids and furnish cheap and commodious avenues for the transport of every conceivable article of commerce gathered from all parts of Holland. It would be extremely interesting to know the cargoes and starting places of the vessels which are pushed along these canals—literally pushed—for tug service is expensive and the restricted possibilities for tacking renders the sail useless. In pushing, the boatman walks to the prow of the boat, thrusts a long pole in the water, then facing the stern, and with his shoulder against the free end of the pole, he literally kicks the boat from under himself as he apparently walks toward the stern. When he risks walking overboard he withdraws the pole and repeats the process, going from side to side for purposes of steering in case only one is poling.

It is a slow and tedious method of propulsion. Surely the saying, "It's a good thing, push it along," must have originated in Holland. Here nearly everything is pushed, and the number of push-carts is far in excess of the number of vehicles for horses. The delivery carts are pushed; small peripatetic shops seem impelled by a magic power, but there is a man behind or a woman; vegetables enough to stock a market are bowled along from street to street; and then the fish—smoked and pickled, fresh or dried, all sorts, sizes, and conditions, alive or dead. The purchaser makes her selection, and the vendor proceeds to prepare the fish for the pan. To the credit of Holland it must be said that a man is not allowed to use dogs to aid in the work of propulsion through the streets.

It is also astonishing to note the variety of goods which are offered for sale from these carts: hardware and tinware, even including small stoves; books, day-books, and ledgers; pens, ink, and paper; glassware, lamp chimneys, cups and saucers; shoes, hats, clothes, old and new, and in fact the only things omitted are medicines and coffins. The dealers in rags, bones, and old iron pick up every imaginable bit of rubbish, and after deciphering its use and burnishing it up a little, offer it for sale on the market square or trade with some brother peddler. I watched from my window two sons of Israel inspecting each other's load. It was a painstaking process. I could not hear what was said, but I could see that one fondly handled a few yards of discarded dress trimming. An offer was evidently made and refused; then perhaps others—a diminution possibly of a cent on the part of the one and a corresponding increase by the other. But to no avail. They separated. However, the longing to buy or the desire to own finally got the better of one, so he stopped and raised his offer, which was accepted and the important deal made. I could see the amount paid; it was twelve cents; but then one cannot estimate the pleasure which the dealing gave.

THE LONE FISHERMAN

But to return to the canal, though if a canal is wanted it is not necessary to turn; one can go straight ahead. But to

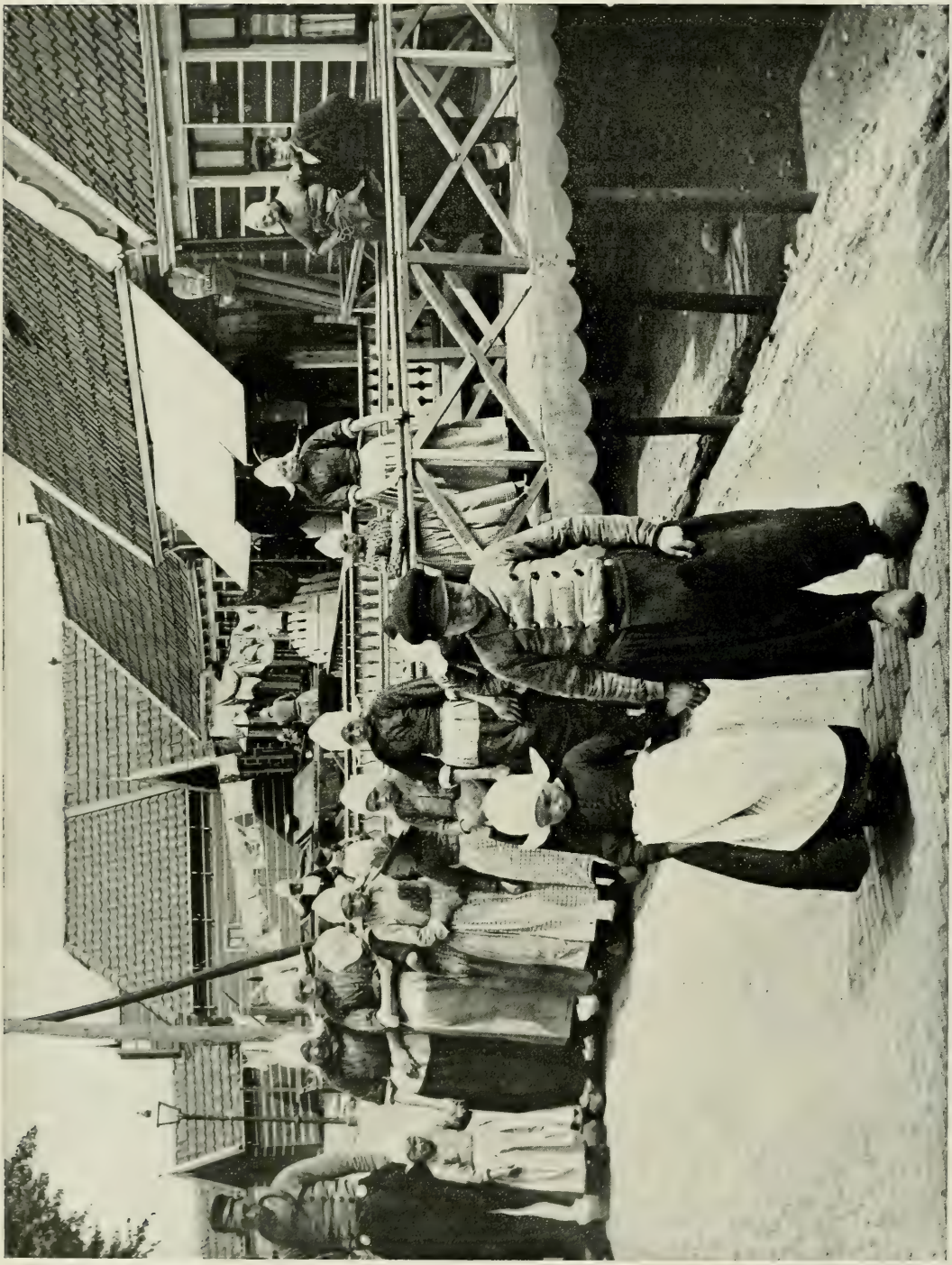
return to the subject. Testy Voltaire on leaving Holland said: "Adieu canaux, canards, canaille." He could not have said it before leaving, for there are canals everywhere—canals large enough to float an ocean steamer and canals so small that they barely admit the boat in which the milkmaid, usually a man, goes out to milk. But I have never seen a canal too large or too small for the fisherman's line. Along the bank of every one, small boys and large boys may be seen waiting for a bite or "a glorious nibble." I have watched hundreds of persons thus engaged and I have seen as many fish in duly authenticated baskets, but I have never seen a fish in its proper juxtaposition with respect to the fisherman. I have set on the bank beside the patient waiter, and as the cork trembled just a little he would say, with a wise look, "That's a cat" or "That's a flat." He did not know, but his surmise was as pleasurable as knowing, and as he lifted the baitless hook from the water his face wore the look of "I told you so." Surely the lone fisherman was a Dutchman.

First and foremost, the canals are drains, except in rare instances; the traffic-carrying is incidental. In the country, since most of the land is below the level of the sea, the soil must be drained before it can be cultivated. Ditches are dug, into which the water runs; then, as these ditches become full, the water is pumped into others having higher banks; then from the latter into others still higher, until finally sea-level is reached, and the outflowing tide carries the water oceanward. The ordinary laws of nature are reversed. Here the drainage is from a lower to a higher level. In the early steps the water is lifted by wind power, but soon the volume becomes so great and such a large area of land is interested in its prompt handling that the state erects a pumping station and a trusted official sees to it that the water in his canal does not remain above its assigned level.

Cities Built on Piles

Thus it is that these drains become waterways. Their banks, made of sandy earth, require reinforcement; they must be faced with stone or fortified by piles large or small. In the case of the larger streams, these banks become dikes, and both stone and piles are needed in order to keep the water within the bounds. There is not a stone quarry in Holland, yet it has more stonework to the square mile than any other country in the world. Its forests are not sufficient to furnish the inhabitants with fuel; still it has millions of great tree trunks wholly underground, driven in to serve as building foundations or hold in check the washing waters. The great dikes along the North Sea, on both sides of the River Maas, skirting the Rhine and the Zuyder Zee, are faced with piles as close together as they can be driven, each one of which cost four dollars to put in place. They are backed up by dressed German basalt or Norwegian granite. If Napoleon claimed Holland because it was formed of detritus carried down by the Meuse and the Rhine, Norway and Germany might demand a reward for holding it.

It is always fascinating to watch a pile-driver; to see it swing a great log erect and into place, and then with stroke after stroke drive it home. I inspected the building operations; saw the men, provided with high-top boots, clearing away the foundations. A steam pump was industriously striving to keep the water out and the pile-driver was thumping away. One morning the entire foundation was full of water, and a second pump was called into action. At last rows of piles were in place, rows like the teeth of a comb; but the pump could not stop. The tops of the piles were cut off at the same height; tenons cut on them and great horizontal beams mortised to them. The space between these beams is filled with sand and the whole is covered with heavy flooring, but the pump kept up its monotonous throbbing. On this floor the brick walls are erected, and soon there stood a great six-story building on wooden feet. When will the pumping cease? Never. Under the building there is a catch-basin, and whenever it becomes full it must be emp-



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NEIGHBORS, BIG AND LITTLE, IN A TIDY STREET OF A DUTCH TOWN

tied; and this I suspect will be very often, for the canal at its side is six feet higher than the basement floor. No wonder that Diderot was surprised that the Dutchmen ever dared to go to sleep.

In Holland an architect must be a hydraulician as well, and every contract has a safety clause allowing extra payment for each pile in excess of the stipulated number. Practically all of the houses of Amsterdam rest on piles. This gave rise to the remark of Erasmus: "I know a city in which the people live like rooks, in the tops of trees."

The Dutch House

Of course these piles never reach solid ground, and at any time they may conclude to go deeper, either individually or in concert. This causes the houses in time to lean, and unfortunately they do not all take the same direction. There seems to be a sort of architectural jamboree, and in looking down one of the old streets one is startled at the angles which the house fronts make with the vertical. Some lean forward, as if impatient to start in a race across the city; others rear backward, like an unwilling criminal dragged to justice; some lean together like conspirators, while others show an inclination to separate, as though they were school-girls fresh from a quarrel. A stranger's first impulse is to to exclaim, "Surely these houses will some day fall." The Hollander will promptly answer, "But they never do."

The heavy material—tile—used for covering the houses makes it necessary to have steep roofs; hence, in order not to waste valuable space in high attics, the roofs all extend in the direction of the length of the house, placing a gable on the front and on the rear. Projecting from the comb of practically every front gable there is a covered beam carrying a heavy hook on which a pulley can be hung. This is of great value in moving, for a rope can be passed over this pulley and the heavy furniture hoisted or lowered at will. In the strict sense of the word, flats are not common, but in the larger cities the majority of the houses are four-storied and accommodate two families, one occupying the two lower floors and the other the two upper floors. Thus all of these houses have two front doors, one opening directly into a hallway attached to the lower apartment, while the other is at the bottom of a stairway whose upper end is the hall of the apartment two stories up. The upper house is called *bovenhuis,* from *boven,* above. It is not a cow-stable, as some have thought, from *bos, bovis,* etc., the Latin for cow. In classic Leyden, Latin signs are quite common. There a room offered for the occupancy of a student is never indicated by the ordinary sign *"Kammer te huur,"* "Room for rent," but in its stead the Latin equivalent, *"Cubicula locanda."*

The long stairway referred to makes moving a difficult task if every piece of furniture is carried up; but by having a wide window in the center of the front on each story, the heavier pieces can be hoisted as mentioned. This obviates the necessity for having wide, easy stairs; and, since they would require so much space, narrow stairs are the rule. As in many of the European countries, there is a tax on windows, not that there is any objection to windows, but because they are taken as an exponent of the magnitude, hence value, of the house. The use of the wide window as an exit for furniture diminishes the necessity for more than one window, and the annual payment of tax to the city is correspondingly diminished. In this case necessity serves as a virtue.

The Dutch Housemaid

Frequently the doubling up of families in a single house is a great convenience. Every morning all of the loose rugs in a house must be shaken. For this service two strong girls are needed; hence if a family keeps only one servant, it arranges with its cofamily for coöperative shaking. The intimacy between the two families may be very

slight, but they will always be ready to unite against dirt, their common foe.

This carpet-shaking is done on the sidewalk, and the work furnishes quite a pleasing sight. In fact, nearly every outdoor occupation in which the Dutch girls engage presents an agreeable spectacle. These prim maids are dressed in striped gingham and wear a dainty cap. They look as though they were members of a great army whose uniform is fixed and invariable. It is true that there is an option as to the kind of stripes selected, and the shape of the cap may differ; so does the uniform of the various branches of an army.

In Holland we notice a fondness for uniform. The postman is uniformed, of course; then, too, the policeman; also the fireman, who always carries a rope for emergencies. The shop porters have a distinctive dress, and so has the runner for the bank; but to the tourist the strangest of all is the funeral attendant. These black-dressed and silver-corded men, wearing cocked hats and sometimes knee breeches, walk beside the hearse, follow it, and accompany each carriage as footmen. After burial, these men distribute notices of the demise to such acquaintances of the deceased as may live in the city.

Near the other end of the vista of life is marriage, and the passing of carriages in small processions, each having at its head one containing a lady wearing a white veil, and a young man conscious of the event, and driven by a coachman with the usual white boutonniére, and drawn by horses whose bridles were decked with white ribbon, suggest a wedding ceremony. In the larger cities parties thus led are observed to be more frequent on one day of the week than on others, and a single query will reveal the fact that there is one day on which second and third class marriage ceremonies are performed.

It is a sensible provision to arrange as many events as possible by classes. It fixes a sort of limit in the important matter of expenditure and discourages a man with a street-car salary from trying to live up to an automobile standard.

MARRIAGE CEREMONIES

In the case of weddings, the class does not determine the grade of husband or wife produced. It is solely a question as to the amount of the fee required, and the fee is fixed by the amount of time given to the ceremony—that is, in the second class the ceremony is individual, while in the third a score or more are married at once.

I assisted—literally assisted—at ceremonies of these two classes. The members of the city council take their turns at these functions. On the day appointed, the brides, grooms, and their friends assemble in a large room in the city hall. The officer takes his place upon the platform, and a clerk at a table picks up the papers previously executed and calls out the names of the groom and the bride. They stand up to acknowledge their identity; then their witnesses are called upon to rise. All the parties are thus, one after another, identified. Then the officer arises and, asking the brides and the grooms to stand up, he proceeds to discourse upon the duties of the wife, the privileges of the husband, and the sacredness of matrimony, closing with the question, "Will you give your consent to the union about to be entered upon, abide by the laws, and live solely for one another?" To this there is in chorus the answer, "Yes." Whereupon he strikes the table with a gavel, saying, "I pronounce you man and wife."

The symbolism of the gavel, so important in Europe on all formal occasions, doubtless in this case points to the forging of chains that bind a contract. This is further strengthened by the retention in legal terminology of the Latin word for chain in certain judicial decrees affecting married couples.

The second-class ceremonies are taken up individually. Each party is ushered into a room set aside for the purpose, one after another, and the ritual repeated for each. On the single day referred to, fifty-seven couples were united.

After the civil ceremony some go to church to pass through the religious rit-

ual, but all go forth to dinner. This is given by the bride's parents, by friends of the contracting parties, or at a restaurant, where each guest adjusts his score.

It is a merry, happy day. No drunken carousing, no boisterous chiavari. There is but little senseless romance in the courtship; no thriftless waste in trousseaus that poorly fit the daily life; but, realizing that partnership has been entered upon, the battle of life is taken up in the consciousness that each is a contributing member of the firm and is in part the custodian of the other's happiness.

No one must think that the Dutchman's stolidity congeals the springs of love or that his practical nature cannot harbor sentiment. At frequent intervals during the past twelve years I have found a resting place in front of the mirrors, reflecting the busy life of Amsterdam. It was more than a place of rest; it was a home, and each coming was made welcome by the recollection that a decade ago I made a photograph of the dear old face and form that soon after left vacant the arm-chair opposite which Mevrouw now sits in sad loneliness.

The Municipal Playgrounds

Over the bridge at our corner is a playground which belongs to the city and is maintained by it for the use of the children. Even during vacation, the teachers of the various schools take their children in turn to one of these grounds, where they can enjoy the many games there provided or try their skill with the different pieces of gymnastic apparatus.

In Amsterdam the playing of the school children is looked upon with reverence, and even the busy money-makers on 'Change turn over the historic Exchange Building to the unrestricted use of the children during the afternoons of the third week in August. This is done to commemorate the saving of the city on one occasion, when the children at play discovered the approaching Spaniards and gave the alarm.

These municipal playgrounds seem to serve as a convenient place in which the children can work off their superfluous energy. Play is natural to childhood, and its interdiction at this period is but postponing the outbreak of pent-up energies. Again, this combination of play with gymnastics puts at a discount the senseless toys that amuse but do not entertain with profit to the mind or body.

The school-houses, being municipal buildings, are put to various uses. They are utilized as polling places. Elections are not wholly devoid of excitement, though the torchlight processions are not deemed of value in imparting the principles of civic government. Before the date set for election, there is sent to every voter a ballot bearing the names of all the candidates in his district. He eliminates at his leisure the names of the persons for whom he does not wish to vote, and on the day appointed visits the polls. After identification and the assurance that all of the prerequisites have been complied with, he deposits his ballot. In preparing this ballot at home, he is uninfluenced by the pressure of the candidates, and is also free from the excitement that might mar his judgment.

It is a wise provision that designates certain city officers as "wethouders," holders of the law or constitution. The very name emphasizes the importance of their trust and suggests that any dereliction means a failure to carry a burden as well as a betrayal of a trust.

To observe the law is natural to a Dutchman, though he protests against nature in his daily war with the sea. His existence in many instances has demanded obedience to a call to strengthen a dike or make it higher, to prevent the water from following the law of gravity impelling it to seek its level. He joins his force to that of others to prevent disastrous overflows and day by day gives an affirmative answer to the question, "Am I my brother's keeper?" While law-abiding, he sees to it that no laws are enacted that are impractical to enforce, and, above all, that his rights as an individual are not encroached upon. In no land is so high an estimate placed

upon personal liberty as in Holland. This may explain the anomalous condition that exists in the educational system. Free schools had their beginning in the Netherlands, and yet compulsory education has never found favor there, because its enforcement would mean the placing over the delinquent child an authority superior to that of the parent.

BEGGARS ARE NEVER SEEN IN HOLLAND

The children bereft of parents are well taken care of in this land. Orphan asylums are abundant and their conduct is beyond reproach. When we see passing by the boy with the two-colored suit—half red and half black, with the dividing line apparently cutting him in twain—we are apt to think it cruel to place upon the unfortunate such a conspicuous badge proclaiming his dependence; but it is a feature of economic administration. When the boys are sent out on errands or allowed a vacation, they are sure to return, for by their unmistakable uniform they are known, and it is a punishable offense to harbor an inmate of an asylum or aid in his escape.

Homes for the aged are seen in every city, and even the insistent demands of commerce in the Kalver stratt of Amsterdam cannot drive out the home in the Luisen Gasse.

There are no doubt beggars in the Holland cities, but they are never seen. The only semblance to one I ever saw was an old man who stood all day long by the door of a dentist. He had evidently learned how relieved one feels upon leaving the chair of torture, and so he stood there to receive the coins dropped into his hand as a sort of thank-offering.

When the Dutch made of their country an ark of refuge for all whom other lands oppressed, the Jews came in numbers, and, finding here opportunities for their skill in trade and commerce, they remained and added greatly to the prosperity of the home of their adoption. They not only contributed to the nation's wealth, but they contributed more nobly by precept and example to the great work of caring for the poor. On this subject alone a book could be written. So deeply is the question of local administration of charitable funds and the alleviation of neighborhood necessities woven into the sympathies of the people, that they preferred rather to see a ministry fall than yield to the governmental demand for governmental direction of charities.

THE PAWNBROKING SHOPS ARE ADMINISTERED BY THE MUNICIPALITIES

Where else can one find an organization similar to the Society of General Welfare? This society, with a membership taken from all classes, has for its purpose the general advancement of prosperity, and seeks to promote the intellectual, moral, and social condition of the people by fostering education, by ennobling their concept of life, by increasing the earning capacity of the wage-earner, and by enabling him to better enjoy the fruits of his labor. In the hundred and twenty years of its existence it has spread abroad good, popular, and cheap books, improved the schools, rewarded deeds of valor, instituted popular lectures, and finally became such a recognized instrument for good that the government on more than one occasion sought the aid and advice of the society, and its usefulness so appeals to the people at large that one person out of four hundred of the entire population is a member. It is safe to say that in all the world there is no charitable organization that enjoys such a widespread membership.

Does any other country maintain by private subscription colonies in which poor families are placed and aided to support themselves by cultivating a plot of ground given them at a small rental? Can any nation boast of pawn-broking establishments created by law and administered by the municipalities? And we would seek in vain for larger per capita deposits in the postal savings bank than we find in Holland. We can do well to repeat the words of Louis XIV: "Have no fear for Amsterdam. I firmly

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PICTURESQUE AND THRIFTY DUTCH COUNTRYWOMEN WITH MILK PAILS BALANCED ON WOODEN YOKES

believe Providence will save her because of her benevolence to the poor."

The perambulator passing by suggests the joy its occupant brought to the home of which it is now a part. Its appearance was regarded by all relatives and friends as a very happy event. In some parts of Holland the dwelling which a little stranger has thus mysteriously entered possesses, by an old law, peculiar privileges and immunities. No outward disturbance is permitted to trouble for a fortnight the residence to which a son or daughter has been added. It is secure from legal executions, from duns and bailiffs; and soldiers, even in time of war, cannot be quartered on the premises.

THE DUTCH ARE THE SECOND LARGEST HOLDER OF AMERICAN SECURITIES

Across the canal that passes my corner is a building into and out of which men are constantly passing. It is an unpretentious house, quite like its residential neighbors. It is only upon coming near that the brass door-plate can tell you that here a banking business is conducted.

If you will enter, you will see but little to suggest business activity and nothing that is sumptuous in the way of furnishing. In the high board partition are many windows with closed shutters having above a sign stating its functions. After selecting the one that promises the service you require, you approach, the shutters open, and in whatever language you find most convenient state your errand. In a time that seems long to one accustomed to the rush of American cities, the business is dispatched, and you leave, wondering how this can be the great institution that takes such a large share in the world's transactions. Express your wonder to your consul, and he will tell you how one of its officers just left with an invoice covering a shipment of a million dollars' worth of bonds to the United States, and how he would not be surprised if a similar visit should be made every day of the week. He could tell you that the Dutch are the second largest holders of American securities, and that governments seldom make loans until the Amsterdam bankers are consulted regarding the terms proposed.

The Bank of Amsterdam was founded in 1609, for the purpose of issuing guaranteed certificates, which are known in our day as bank notes. Against these notes coin was held, at one time reaching the enormous sum of $180,000,000. The business world was so confident of the solvency of the bank that these certificates were universally at a premium. The bank was under the management of the Amsterdam corporation, the chiefs of which examined the treasure annually and made oath that it was of the amount stated by the managers. It should be mentioned that this institution antedated the Bank of England by nearly a century.

GAUGING THE WATER LEVEL

From my window I can see in the canal, against its walled face, a board projecting above the water. With its black horizontal lines and figures it looks like a giant thermometer without the tube of mercury. At the top are the letters A. P., and the numbers have minus signs. If one watches the water level, one will observe that day by day there is a slight fluctuation in the point reached by the water's surface. A single question would elicit the information that this is a gauge, that the letters A. P. signify the bench-mark of Amsterdam, or the zero to which all water levels are referred, and that the minus sign indicates that the water thus recorded is *below* this zero. When you first learn that the water upon which you are looking is below the level of the sea you shudder; when you are told that a large part of Holland is lower than the ocean that beats against its shores you tremble. There are many such gauges placed in the canals of Holland, and, being connected by precise levels, the markings on all are exact in reference to the Amsterdam zero.

Since a large number of smaller canals are emptied by wind pumps into each larger and higher one, the pumping at each transfer station cannot be unlimited, for then water might be put into a canal more rapidly than it could be pumped out. Then, too, the final canals emptying into the sea have their discharge limited by the height of the tide at their mouths. Thus it is necessary that at each station the height of water should have a fixed and defined limit. Then the man in charge of each station is told that he must not pump after the water in the receiving canal has reached a certain height, and that the water in the lower canal should be kept below a certain level—that is, if it rises above that height there is danger of an overflow. From this it can be seen that a local engineer might be embarrassed by conflicting orders. He may be forbidden to pour water into one canal because it is ready to overflow, and know at the same time that the lower canal is dangerously full. Fortunately for him, he is not called upon to worry about this. The latter condition had already been observed by the district inspector, and notices served that pumping into this lower canal should cease at once. The canals still lower might thereby be in danger of overflow, but that would cause

the pumps still lower down to stop until the individual farmers would be forced to throw their wind pumps out of gear. This might cause some fields to become submerged, but the principle is observed that it is better for the water to rise gently over a few fields than to have a large canal burst its banks, and the rushing waters endanger life as well as property.

This entire question of drainage, the conduct of river waters to the sea, and the protection of exposed shores are under the direction of the Ministry of Water Affairs. So important is this department that it might be called the Ministry of Interior Defense and Internal Expansion.

As you ride along in the cars you sometimes see windmills so small that you are inclined to think they are toys. Not so. They are sentinels. With vane outstretched it is always in the wind, and is ready to respond just as soon as it is thrown into gear. This is accomplished by a wooden float on the surface of the water immediately under it. The rising water lifts the float, and when it reaches a height which threatens to submerge the surrounding fields the machine is thrown into gear, and the revolving wings warn the farmer to start his pump and keep it going until his truthful ally coming to rest tells him that the danger is past.

DRIVING OUT THE SEA

Just outside of Amsterdam there was, years ago, an inland sea over which vessels sailed, and on which at one time a fleet of seventy vessels gave battle. In November, 1836, a violent west wind drove the waters of the lake into the very streets of Amsterdam. They swept over fields, and covered the opposing dikes, and even bridges. On Christmas day a fierce east wind arose and hurled the waters of the lake back again, and did not rest until a part of Leyden was inundated. An entire year was consumed in freeing the submerged land, and great losses resulted from the overflow. This was the final provocation. The challenge was accepted, and the battle was to be to the death.

An encircling dike was constructed, with a large canal on its outer face. Into this great pumps, lifting a thousand cubic feet at each stroke, poured the water of the lake into the encircling canal. After thirty-nine months the commission charged with this work made the laconic report, "The lake is dry," and the medal they issued in commemoration of the event contained in Latin the inscription: "Haarlem Lake, after having for centuries assailed the surrounding fields, to enlarge itself by their destruction, conquered at last by the force of machinery, has returned to Holland its 44,280 acres of invaded land."

These acres are now occupied by about twelve thousand people, and their products are the choicest of the land. In this vast plain, so recently the foraging ground of crabs, lobsters, and eels, straight roads are bordered with feathery-topped trees such as Hobbema painted; substantial and even elegant farm-houses are seen on every hand; throughout the commune there are police, cemeteries, fire companies—all the appliances of Dutch civilization—as well organized as in any of the older districts.

The commission is quite pardonable when, after recounting the material benefit resulting to the state, it says: "But this is not all; we have driven forever from the bosom of our country a most dangerous enemy; we have at the same time augmented the means for defending our capital in time of war. We have conquered a province in combat without tears and without blood, where science and genius took the place of generals, and where workmen were the worthy soldiers."

There are still within the borders of Holland thousands of acres of first-rate mud aching to contribute toward the making of Dutch cheese for the foreign markets, but their existence is smothered out by the same thousands of acres of overlying brackish water. There are also many Dutch fingers itching to feel

the guilders that would come in exchange for the cheeses thus produced. In time the government will set about to relieve the aching and the itching, and the Zuyder Zee, passing into history like the Haarlem Lake, will place seven hundred square miles at the disposal of the Dutch farmers. The soil thus rescued will, for a time, give out a leaden cloud of fever and ague which no steam pump yet invented can lift away, but which will be worked off by Dutch patience and quinine.

EVERYBODY IN HOLLAND LOVES FLOWERS

In the world of horticulture Haarlem and tulips are synonymous. It is here that the air is filled with a delicious perfume and the eye charmed by the sight of acres of hyacinths or tulips, which are planted so closely that they seem huge carpets, with the brightest colors in their designs, laid down by mother earth for her own housekeeping. Here are seen tulips uncolored, fine, and superfine; monsters, hybrids, and thieves classified into a thousand orders of nobility and elegance; tinted with all the shades of color conceivable; spotted, striped, and speckled with leaves fringed, waved, and festooned; decorated with medals of silver and gold; distinguished by the names of artists, generals, and statesmen; characterized by bold and loving adjectives recalling crossings, adventures, and triumphs—all leaving a sweet confusion in the mind of beautiful images and pleasant thoughts.

Everybody in Holland loves flowers. The winter is long and bleak, so when spring comes nature breaks forth in beauteous rejoicing, and man looks with gladness upon the evidence that summer is near.

Upon the banks of our canal there is every Thursday a flower market, and as I look out I see a man admiring with wistful gaze the potted plants and flowers before him. The grimy iron wheel under his arm tells that he is a diamond-cutter. The wheel he carries is the revolving disk against which he presses the little gem that mocks him with its brightness and defies him with the impossibility of its possession. For him the seasons pass without change or chance, the days come and go, the hours follow in an unbroken repetition of wistful work, and life, creeping darkly on, knows no rest until its end has come.

To one who makes a rapid run through Holland there comes a feeling of disappointment. He sees less of the amphibious element than he had expected; the people move too slowly to justify the claims made for their attainments, and there is a dearth of the quaint costumes of which he had heard so much. But for the person with eyes open to the beauties of art, mind keen to grasp the effects of environment upon character, and heart responsive to efforts put forth for the amelioration of sorrow and suffering, no land under the sun possesses so much of interest or gives so much to the tarrying tourist.

Toward Holland my face turns in gladness, and the fleetest agencies of transportation, in taking me thither, would move too slowly were it not that, on stepping aboard one of the ships of N. A. S. M., the captain's greeting calls to mind the fact that I am under the flag of Holland.

In leaving, my eyes look with a sentiment of respect and tenderness upon the flower-decked windows, the silver helmets, the livid sea, the downs, and the windmills that bristle over the landscape and swing their arms as if in adieu.

There is a feeling of depression as the gables, masts, and steeples fall behind. The gathering haze of distance softens the outlines of things material, and there come the visions of Rembrandt, Erasmus, Boerhave, Grotius, Barentz, William of Orange, gracious Wilhelmina, and all the beautiful and noble images of that glorious, modest, and austere country.

But, like the days of sojourn, these visions, too, pass away, but memory brings cheer in the echo of the reassuring words expressed on parting,

"TOT WEERSIENS."

PEASANT LIFE IN THE BLACK FOREST

By Karl Frederick Geiser

With photographs by the author

THE Black Forest region, which has given the world so many beautiful legends, weird superstitions, curious stories, and folk-tales, covers an area of nearly nineteen hundred square miles. The Rhine forms its natural boundaries on the south and west; its eastern mountain ranges are bordered by the plains of the Neckar and the Nagold, while its northern limit is marked by Baden-Baden.

A convenient entrance into the heart of the northern district of the Black Forest may be made from Freudenstadt, a city of some ten thousand inhabitants, situated high on one of the outer mountain ridges which forms the northeastern boundary. From here an incline railway descends toward the northwest into one of the most beautiful valleys of the entire region.

Removed from the beaten path of the summer tourist, unspoiled by frequent contact with Americans prone to heavy "tipping," here is a country where life may be observed in its rustic simplicity, a community undisturbed by invention and improved machinery, a remnant of the ancient Swabian race, whose political importance has long since departed and whose former warlike proclivities have been changed with the mellowing influence of centuries into the arts of peace. Here dwells a people abiding by the same manners and holding the same customs which their fathers and grandfathers before them held. Germans they all are, but unlike the north German in nearly every respect save in the sturdy qualities of honesty and continuity of purpose—qualities common to the race, speaking a dialect that is scarcely understood by a Prussian or a Saxon.

The dominant impression of this region is made by the forest which crowns every hill and borders every valley. There are no large cities, and hence no great collections or museums containing treasures of art; there are no large estates, and therefore no splendid mansions, as in rural England.

However, the region is not without historic interest. Here and there an ancient cloister that has lent its name to a hamlet or village or stands in some isolated retreat, converted into a dwelling, reminds one of the days of the monks and the vicissitudes through which generations have passed. Indeed, there is scarcely a valley or mountain that has not furnished a legend or folk-tale to German literature.

A few hours' walk to the northwest of Baiersbronn leads into the deep recesses of the forest, and a by-path up the mountain to the weird Mummelsee, the abode of the nixe; and still farther up the Hornisgründe, the highest elevation of the northern district, is to the Black Forest what the Brocken of the Harz mountains is to northern Germany—the abode of witches.

Upon this marshy, elevated plateau, covered with low shrubbery, rush grass, feathermoss, liverwort, and sundew, a solitary watchtower has been erected to guard the traveler from the alluring will-o'-the-wisp, so the credulous inhabitants of the region say; but, as it was built by the state in 1871, it is more likely that its purpose is military, serving as a point of observation in case of a French invasion. However, it affords a splendid view to the peacefully inclined, as it is situated upon the great divide between the Rhine and the Neckar.

Immediately to the west the glassy surface of a mountain lake reflects a castle situated upon its opposite bank, while beyond and below lies the Rhine Valley, dotted with villages and hamlets, and far in the distance, beyond Appenweier, the minster tower of Strassburg, veiled in smoke and haze, rises against the hori-

A HAMLET IN THE BLACK FOREST

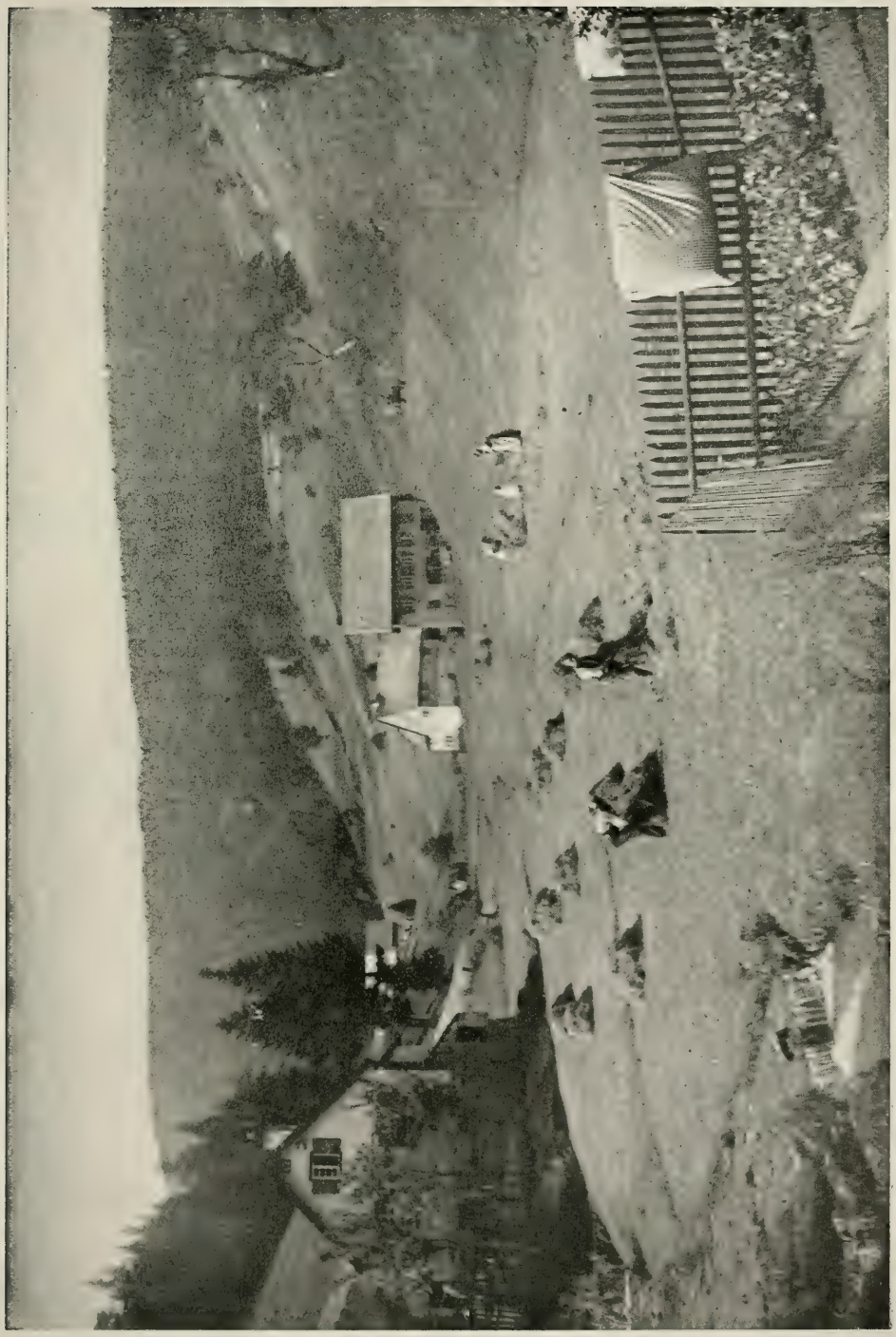
zon. To the east an array of mountain peaks, divided by the valleys of the Murg, Nagold and Neckar, project their forest crowns, and a little to the right and far beyond the Jungfrau and other noted peaks of the distant Alps may be seen, while the great ranges of the Black Forest extend in parallel ridges to the south.

A short journey southwest of Baiersbronn brings one to the source of the Murg River and to the famous "high road" or pass of Kniebis, celebrated during the wars of the French Revolution. This road, paved and graded to bear the heaviest artillery and extending for miles along the crest of the highest mountain ridge, connects the Rhine Valley with the Neckar, was one of the passes used by the French in invading south Germany and was taken by them in 1796 and 1797.

SPLENDID ROADS

Aside from the forest itself, one of the most striking features of the Black Forest district is the magnificent system of roads. Every valley has its stream, and close by the side of every stream the main road, uniformly fifteen feet in width, bends gracefully along its banks and accompanies it from the lower part of the valley far up to where the narrow cleft loses itself in the forest; here it may turn and follow the course of a mountain ridge or it may pierce the divide and descend the opposite slope into the valley beyond.

These roads are even better kept than the roads of rural England; they are more uniform in their width, and their edges are trimmed to the sod with a nicety and precision that reminds one of the roads and walks in the most elaborate



A TYPICAL BLACK FOREST VALE IN JUNE

parks of the great American cities. Here they do not wait until the roads become impassable, nor until a mishap or wreck calls attention to defective road-beds, before repairing them. Their care, intrusted to experienced road-menders who are subject to official inspection, is so systematized that a definite number of men is constantly employed for this purpose. The granite used for their construction and repair is quarried from the neighboring hillside, and this requires additional laborers, while transporting, cording, and crushing the stone at the roadside raises the laboring force necessary to the maintenance of roads to a considerable number—in fact, forestry is the only other occupation in which a greater number of constant laborers is employed; and as forestry is the chief occupation of the inhabitants, the need of numerous well-kept roads of easy gradients is a practical necessity for the transportation of the heavy timbers.

Each road is divided into short sections, and a road-mender is assigned to each section. The menders constantly patrol their beat and vie with each other in keeping their respective sections in faultless condition—free from depressions, trimmed and swept as if constantly expecting company—and all for fifty cents a day. The only perquisite which adds to the small income of these road-menders comes from the sale of the daily sweepings of the road-bed, which is purchased for fertilizing purposes by the farmers along the way; but the result of these sales seldom exceeds $10 a year.

Thus, at a comparatively small expense, a perfect system of highways is maintained. The main roads, which are kept up by the state, and connect valley with valley and crest with crest, and bind the whole Black Forest district into one vast network, are again intersected at various angles and points along their courses by the local roads, kept up by the community; but the plan of construction is the same in all; all show the same scrupulous care. Sometimes they are flanked by raised foot-paths, sometimes by fruit trees, and always, on the side of a steep incline, by stone posts placed at regular intervals.

What the Appian Way was to ancient Rome, what Unter den Linden is to Berlin, these highways are to the Black Forest; they are substitutes for railways and electric lines; they are the post-roads and the streets over which every phase of life of this densely populated community passes, and, being everywhere so uniformly well kept, they lend a tone of prosperity to the general beauteous aspect of the landscape.

POOR BUT COMFORTABLE

It would, however, be erroneous to suppose that the people in general were even in moderate circumstances; with occasional exceptions, the great mass are poor. The remarkable fact is, how general poverty can transform a country into such wondrous beauty, and how, under the limitations placed upon them by nature, all manage to earn a living, for the community is free from the proletarian class. Certain it is that the poetic side of the Black Forest lies in the external beauty of the landscape, in its many-tinted wild flowers, in the song of the brook and the nightingale, in the hum of the mill, in the bright sunshine—in a word, in nature—while the songs of real life are often written in a minor key and a sadder strain.

"How do you manage to live on so small an income?" I asked a communicative road-mender, who informed me that he received only fifty cents a day and had a family of eleven children.

"Well, we get along some way. I also have a small farm of three acres; two cows, three pigs, and a few chickens. The oldest girls work in inns; the boys in factories and some in the forest. Sometimes it's hard, but we live and are contented."

This is the story one frequently hears; it represents the wages and general condition of the average common laborer having a large family, and the number of children to a family is seldom less than seven and not infrequently fifteen.

The report of a woodsman, a well-known character of the community, was

A MAIN FOREST ROAD AND ROAD MENDER

more hopeful: "Yes, I have been a woodsman for forty years, and my father was one before me," he explained. "We are all contented, have good health, and are not without pleasure and amusement. I own my home, have seven acres of land, occasionally sell a cow or a pig, and though I average only two marks (fifty cents) a day for perhaps two hundred days in a year, we have saved at least, besides our home, ten thousand marks."

As he delivered himself of this speech he again lighted his Schwarzwald pipe and concluded philosophically, "The main thing is health and contentment, and that we have."

Hotel and inn keepers are often in comfortable circumstances and their families enjoy some of the luxuries of life, while the owners of mills, factories, and other industrial plants are often considered men of wealth. On the other hand, there are those of extreme poverty, who seldom have sufficient plain food to satisfy hunger; but the condition of the great mass of the community may be fairly represented by the road-

A WAYSIDE HUT IN THE FOREST FOR THE PROTECTION OF FOREST WORKMEN AND TRAVELERS

mender and the woodsman quoted above. In other words, the majority of the community is made up of two classes: those who barely make a living and those who have a small annual surplus. Under the restricted circumstances, these results are indeed remarkable, and the manner in which these results are obtained is as instructive as it is interesting.

Every inch of soil is utilized to its utmost capacity; even the rocky slopes of the hillsides, which in America would be a barren waste, are made to yield the giant timbers. The income from the common forest alone pays the salary of all the officials, furnishes the necessary means of maintaining the splendid highways, and in the Gemeinde of Baiersbronn pays to every burgher an annual revenue of thirty-five marks in cash, which he may draw from the public treasury or cancel against his taxes. This does not include the revenue from the royal forest lying within the territory of the local community. Each local governmental unit has a forest of its own, which is managed and cared for by the local officials subject to the general supervision of the state, which provides that both in the royal and in the community forest the amount of timber cut annually shall not exceed the annual growth. It is thus that the forest is perpetuated from generation to generation and that this important industry furnishes constant employment to a definite number of workmen. Forestry thus becomes a science and every man connected with its care and management, from the highest official to the common woodsman, be-

A NURSERY IN THE BLACK FOREST

comes an expert in an occupation which he enters for life.

The same kind of economy which is applied to road-making and forestry is applied with equal skill to farming. The farms are uniformly small, averaging, as a rule, from three to seven acres and ranging in value from two hundred to five hundred dollars per acre. These garden-like patches which fleck the valley, when seen from an elevation, present the appearance of a crazy quilt with a green background. No hedges nor fences intervene to suggest mine and thine, nor is there, as in rural England, an agricultural class distinction. There are no landlords and no tenants, and the entire community is a neighborly congregation, where the land of the villagers and peasants lies side by side and where mutual assistance is freely rendered during the hay and harvest season.

Cattle constitute the chief live-stock of the community, but they are never allowed to graze, being housed winter and summer and fed upon hay and meadow grass cut by the scythe and doled out in quantities to entail the least loss and net the greatest returns.

Every meadow yields annually two crops of hay, and as moisture is a necessary agency to the rapid growth of vegetation, the dry, sloping elevations are often irrigated, while the lower levels are drained by numerous tiny ditches. Thus the mountain brooks, as they emerge from the forest rim in the upper part of the valley, are often walled and led along the upper edge of the fields and meadows to supply the moisture in the absence of rain and to retard the erosion of the alluvial deposits.

Thus every foot of arable land is kept fertile; not a nook nor corner of the

A TYPICAL BLACK FOREST HOME

valley is unproductive; not a hill nor rocky slope but bears the pine or fir. Since the scythe, the hand-rake, and the flail have not been supplanted by improved farm machinery, the chief value of one of these small estates is represented by the land, live-stock, and the buildings upon it, though in many cases the farms are without buildings, their owners being the village cobbler, blacksmith, merchant, or baker. In fact, nearly every family is the owner of a small farm which has been the heirloom for many generations.

But the cultivation of every natural resource and the exclusion of all waste does not alone account for the fact that this region sustains a dense population free from drones, paupers, and dependents; for, aside from the physical and mental unfortunates, there are indeed few who are not self-supporting. Indeed, the greatest cause of the general success of the community lies in the industrious and frugal habits of the inhabitants themselves.

The peasant or wage-earner in the Black Forest would enjoy the luxuries of life, but he first and last measures his own station in life and adjusts his comforts and expenses accordingly. Instead of the expensive cigar, he procures a famous Schwarzwald pipe which lasts him a lifetime. Tobacco at four cents per packet supplies the necessary combustible material. He travels, too, in his narrow circle; but a homely knapsack and a loaf of black bread takes the place of the dining-car meal, and the numerous wayside inns furnish the liquid portion of his meals at prices passing cheap, while for lodging he seldom pays more than a mark. No false pride leads our German peasant to assume a rôle which he cannot play to the end.

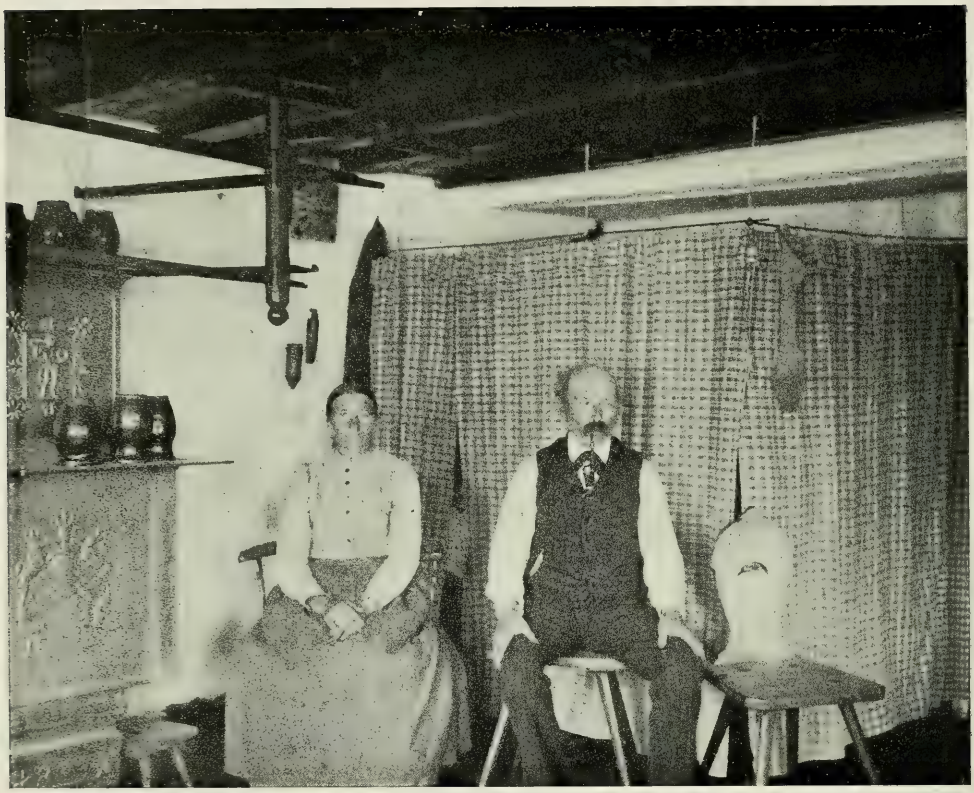
Observe the immigrant and his equipage as he lands in New York or wends his way westward to friends. You see

THE VILLAGE SMITH'S WIFE, WITH FIVE OF HER FOURTEEN CHILDREN

him much as he is in his native land, though you do not understand him, for he is not insensible to the gibes of his new countrymen, nor to the injury he receives at the hands of unscrupulous employment agencies. He is human; thinks and feels the same as those who take advantage of him at every turn, and in America he prospers, not entirely because he is in the "land of the free," but because of habits of frugality and industry acquired in the fatherland and because he lives within his means.

Among his own native hills the chief means of conveyance is the royal post chaise, which contains seats for twelve passengers; but this is seldom crowded and more often empty, for though a mark entitles one to ride a comparatively long distance, few of the inhabitants of this region feel that they could afford to pay the price of a half day's labor when the journey can be accomplished on foot. The hard, macadamized roads are, it is true, wearing upon the ordinary smooth-soled shoe; but here shoes, as all articles of wearing apparel, are made entirely with a view to service. The same style of costumes worn by their fathers and grandfathers are still in vogue, and, judging from the past, will be till the race has run its course.

The purchase of a festive garment is no small event in the life of the average peasant; it becomes a milestone from which he reckons the minor events of his life—not merely because this addition to his stock may be his wedding suit, but because a tailor-made garment represents ten dollars in cash. Little wonder, then, that it is worn only on special occasions and is often handed down from father



A CORNER IN THE LIVING ROOM. THE CURTAINS ENCLOSE THE BED

to son. Economy in dress is but one instance out of many which might be given explaining how a peasant supporting a large family can live, and sometimes even prosper, on an income that would not supply the want of an American under similar conditions. An American laborer spends more in five years for dress than the average laborer in the Black Forest does in a lifetime.

The average home of the peasant exhibits economy in its painful extremity. The furnishings of the rooms are reduced to an uninviting limit. A stove, a table, a few plain wooden chairs, and a long bench constitute the chief articles of furniture in the living room, which sometimes also contains a bed. The walls are hung with a few pictures, and a large wooden clock, serving as a useful ornament in every home, sometimes relieves the gloomy appearance; but the bare floors and the low ceilings form an oppressive contrast to the beautiful out-of-door landscape, with its green meadows and blue-vaulted sky resting on the forest-crowned hills.

The interior of a home is seldom attractive, and as farm houses here never have a modern system of plumbing or ventilation, the odors from the stables, which sometimes permeate every room, cause you to sigh for the out-of-doors. Nor is the unattractive interior due to lack of cleanliness, but rather to the plan of construction of the house. Many of these houses are centuries old, and the present occupants must make the most of their inheritance.

The same roof which protects the family shelters the live-stock, hay, grain, and the simple farm implements. The base-

WOMEN ON THEIR WAY TO WORK IN THE FOREST

ON THE ROAD TO THE HAY FIELD. CATTLE ARE USUALLY EMPLOYED FOR TRANSPORTATION PURPOSES

ment is used for live-stock and implements; the first story, entered from an outside stairway, is the family abode, while the loft, from front to rear, contains the hay and grain.

The peasant thus dwelling in mutual concord with his cow and his ox is not prepared for guests. In fact, no private dwelling is constructed with a view to receiving friends. The inns are for this purpose; they form the social centers or meeting places of the neighborly groups of the community.

But in nothing is poverty and economy shown more than in the frugal meals, served five times a day. Coffee, black bread, butter, milk, potato soup, with an occasional omelet and salad, would be considered a wide latitude in a daily bill of fare, while a single article of diet, such as potato soup, will often constitute the entire meal. In many homes meat is served only on special holidays, and in practically no home do we find it in satisfying quantities. A home-made brew or fermented beverage, however, is never wanting and is always offered—perhaps with a callous hand, but with a warm heart and cordial hospitality—to the friends or chance strangers who enter the home.

The limited means in the household economy bear most heavily upon the wife, for the husband must devote his entire time to work in the factory or forest in order to meet the necessary expenses involved in the support of a large family. The woman, therefore, enlists our sympathy. The care of a large family, one would think, would alone be sufficient to occupy her attention. But the burdens of motherhood are by no means the greatest, for children here are never spoiled by attention; like "Topsy," in Uncle Tom's Cabin, they "just grow" and take care of themselves and seem to be none the worse for it. All the drudgery about the little farm falls to her care, and if at times, as during the haying season, she is assisted by the men, she never shrinks from performing her part of the most arduous tasks.

And neither youth nor age exempts the weaker sex from man's labor on the farm. I have seen the young girl of fifteen years, in company with her stooped and decrepit grandmother of seventy, swing the scythe to the rhythmic measure of the lords of the household. As the limited means and views of woman prevent her from realizing her true condition, she patiently submits, and even seems to enjoy her routine labor. In fact, she would be ill at ease if she were treated with that consideration which American women enjoy. An incident may serve to illustrate her own estimate of her duty and position.

I had left a piece of luggage for several days at a remote little farm house, and when I returned for it I observed that the "Hausfrau" was preparing to carry my load to the station. Determined, however, for once, to inaugurate an American custom, I proceeded to take my luggage, when she exclaimed in mortified astonishment,

"What! you carry your own luggage; what would the people of the dorf think of me if I allowed it?"

"Tell your people I am an American," I replied.

She looked puzzled; she could not understand it. "What! don't the women in America do such things for the men?"

"No," said I, "and they shall not do it for me here."

And then it dawned upon her: "What a paradise America must be!" And the tears came to her eyes and she seemed to realize, perhaps for the first time in her life, the hard lot of woman.

Children, too, are early taught to work, and when not in the *Volksschule,* which compels their attendance until they are fourteen years of age, they are employed in light work in the forest or field.

Barefooted little girls at seven years of age may be seen knitting, and at the age of ten, with motherly solicitude, taking care of the babies. Nor does the seeming lack of parental attention have a deteriorating effect upon them; at least they are free from the brazen impertinence so common among American children, and, unless chilled into silence by

THE MAIN STREET OF BAIERSBRONN, IN THE BLACK FOREST

your strange presence, they always salute you with a *"Grüss Gott"* in meeting you upon the highway.

But whatever restrictions the hard, routine labor places upon the inhabitants, they are not without recreation, religious life, and amusements; not without their social gatherings at the inns, not without their folk-songs, and not entirely without a knowledge of the outside world.

Every child attends the Sunday school; practically every adult is a member of the Lutheran Church. The parish minister, therefore, who is appointed and paid by the state, is an important personage and wields a powerful influence over the thought and life of the community. In addition to his religious duties, he is general supervising inspector of the public schools. This position gives him a special opportunity to direct the religious instruction of the youth.

Next to him in importance is the schoolmaster, coöperating with the minister in sacred as well as secular instruction; for he not only directs the music of the church service, but is the regularly appointed Sunday-school teacher. For this service, however, he receives extra pay, and as a consequence regards this part of his work as seriously as that of his regular school duties. Religious instruction of the youth is, therefore, thorough and systematic; in it every child must follow a regular course leading to the "confirmation" certificate, which represents the completion of the biblical instruction.

But while the minister is supported by the state, except occasional voluntary contributions for private ministrations, the church edifice itself is raised by voluntary gifts from the members. By nature and training intensely religious, the inhabitants lend a willing support to an institution which strengthens their faith in a future life as rich and perfect as the present life is destitute and incomplete.

THE CELEBRATION AT MITTELTAL (SEE PAGE 649)

The chimes in the little Gothic tower which announces the hour of worship each Sunday morning summon willing worshipers; troops of men, bareheaded women, and barefooted children flock with unequal paces to the temple of worship, cheerily chatting along the way. In the corridor of the church they separate—the men occupy the galleries; the women, the nave, while the children flank the altar, the girls occupying the right and the boys the left. Thus grouped about him, the minister may conveniently address his remarks to any age or sex.

The sermon is usually on the old-fashioned order, against that old fashion inaugurated by Adam—sin; and the congregation leaves the church with a stronger faith in that still older fashion—immortality.

Betrothals are announced by the minister from the pulpit with a request for the prayers of the church for the guidance of the newly plighted; and after the service the congregation waits in front of the entrance while the clerk of the community announces the new edicts and laws of the mayor and council that may have been issued during the past week.

The Sabbath, however, is not the only day which brings immunity from toil; the observance of some national event or the celebration of some local society occasionally interposes a holiday. Once every year entrance examinations for the army are held in the various localities, and this furnishes the occasion for general hilarity among the young men who have passed the examination successfully and are to enter the military life for two years.

I have recorded in my notes a typical festive occasion, the events of a bright day in June. We were awakened early

in the morning by the roll of the drum and the tramp of the march. It was "flag day;" a *Sangverein* was to christen its banner, and nothing short of a holiday was required for this important event. Local singing societies from the neighboring valleys were to meet, form a grand union and adopt a common banner, and this event was to be celebrated in a little village called Mitteltal. The local organization of this place had been preparing for some time, and today their little band of musicians was up early to practice marching. The day had been hailed with delight by the children, for there was something doing now. The main roads to the little town had been spanned by triumphal arches; the houses along the way decorated with wreaths and garlands as a token of respect, and the inhabitants had donned their best clothes. No triumphal procession ever passed through the famous Brandenburg gate at Berlin with a stronger consciousness of honors deserved than did that band of peasants on this occasion. And why should they not? The pomp and ceremony of kings and emperors are but adulations of self, after all; and if perchance a royal procession be composed of victorious legions home from conquest, why should war—official murder—be extolled above the simple annals of a peaceful life transcribed in song? Nor have these peaceful citizens of the fatherland been deaf to their country's call to arms. In 1870 these peasants laid down their lives at Gravelotte, fought valiantly at Sedan, and marched on to Paris as willingly as now they wear the badge of their *Verein*.

One may roughly describe the people, their customs, occupations, ambitions, and ideals; but the beauty of their country is beyond the pen or brush of the artist. A botanist might name the wild flowers, but no picture can convey to another mind the fragrance of the new-mown hay nor the thousand varied colors of the wild flowers that smile from the valley in June. In fact, many flowers that are cultivated for their beauty in rougher climates grow wild here. Small varieties of variegated pansies and delicate, sweet-scented pinks grow in abundance. The green meadows, the murmuring streams abounding in trout, the hills crowned with the forest whose dark-tinted foliage has given the region its name—*Schwarzwald;* the song of the birds, the occasional sight of the roe and the fawn, and, above all, the calm air and the bright sunshine—these are some of the charms of nature among which this people dwells.

HOW THE WORLD IS SHOD

NOT quite so varied as the head covering but fully as characteristic and interesting are the peculiar styles of footgear worn by the nations of the earth. Undoubtedly the shoe of today had its origin in the sandal or sole devised for the double purpose of protecting the bottom of the feet from rough ground and extremes of temperature.

Sandals and shoes of papyrus and leather of beautiful workmanship worn by the early Egyptians are treasured in the British Museum. The ancient Hebrew wore a sandal with a sole of leather, cloth, or wood occasionally shod with iron. The Greek κρηπις, Latin *crepida,* occupied a middle position between a closed boot and a plain sandal; its simplest form had a high and strong sole often studded with nails. About the heel of the *crepida* was a series of loops into which the thong was laced across the top of the foot and through the toe strap; this was worn mostly by the greatest pedestrians, the workman and the soldier.

Another primitive form of shoe is the Indian moccasin of buckskin, soft and flexible, a splendid foot covering, but of little use, however, in a wet country, so the Aborigines of America above the Arctic Circle had recourse to sealskin cured without sweating and fishskin to keep the feet dry, while the sabot, the clog, and the chopine show how western Europe wrestled with the problem of the very essential foot covering. Among the great industries of the United States the manufacture of boots and shoes ranks tenth, for the year 1905 the total output of boots and shoes in this country being 242,110,035 pairs, representing a value of $320,170,458.

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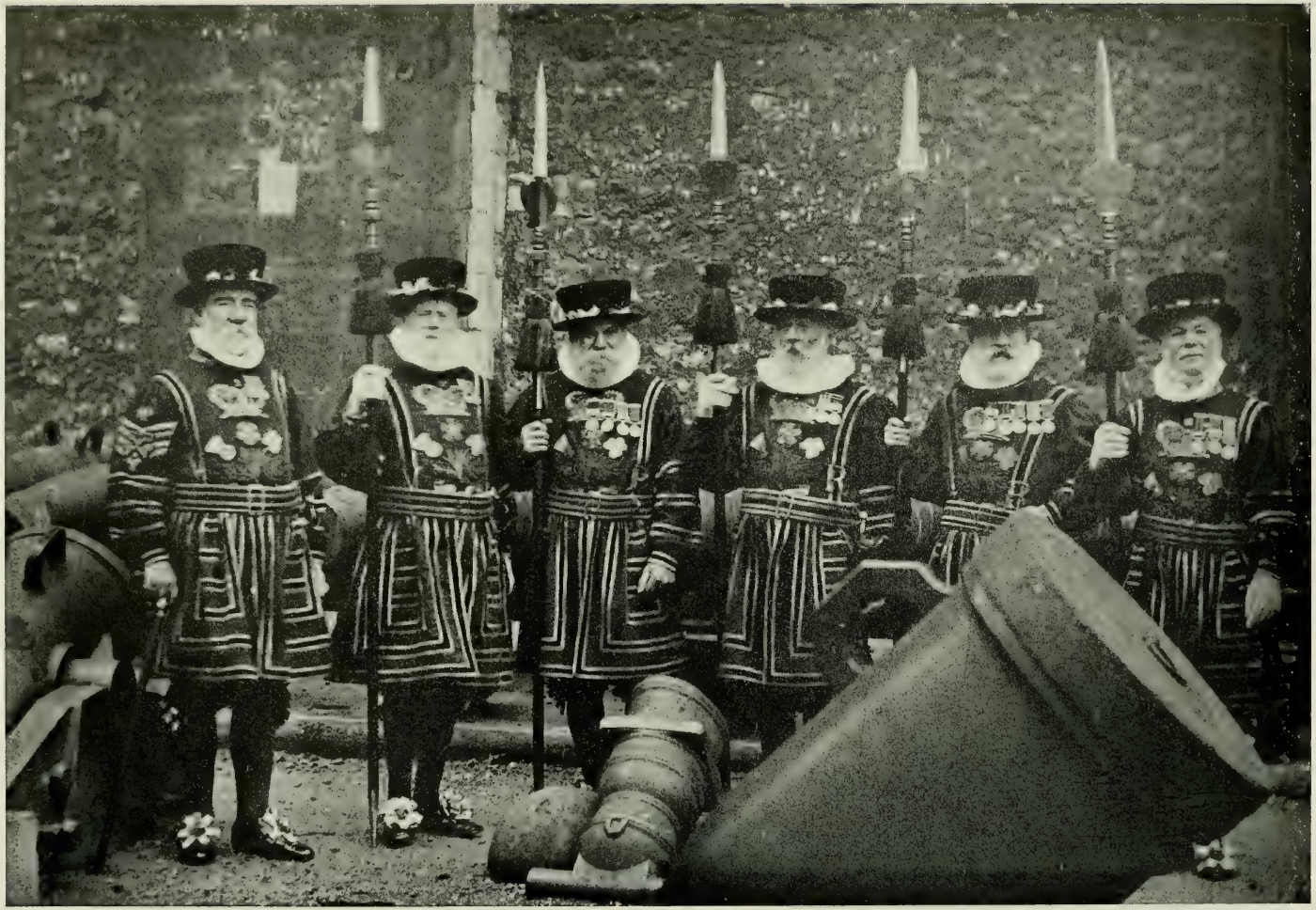
HIGH LEATHER BOOTS WORN IN RUSSIA, MADE NECESSARY BY THE ILL-KEPT COUNTRY ROADS

Photo and Copyright by Underwood & Underwood, New York

AN OUT-DOOR SHOE FACTORY IN FRANCE

These Breton peasants work all day in the forest on heavy wooden sabots, the men doing the heavier parts of the work and the women putting on the finishing touches



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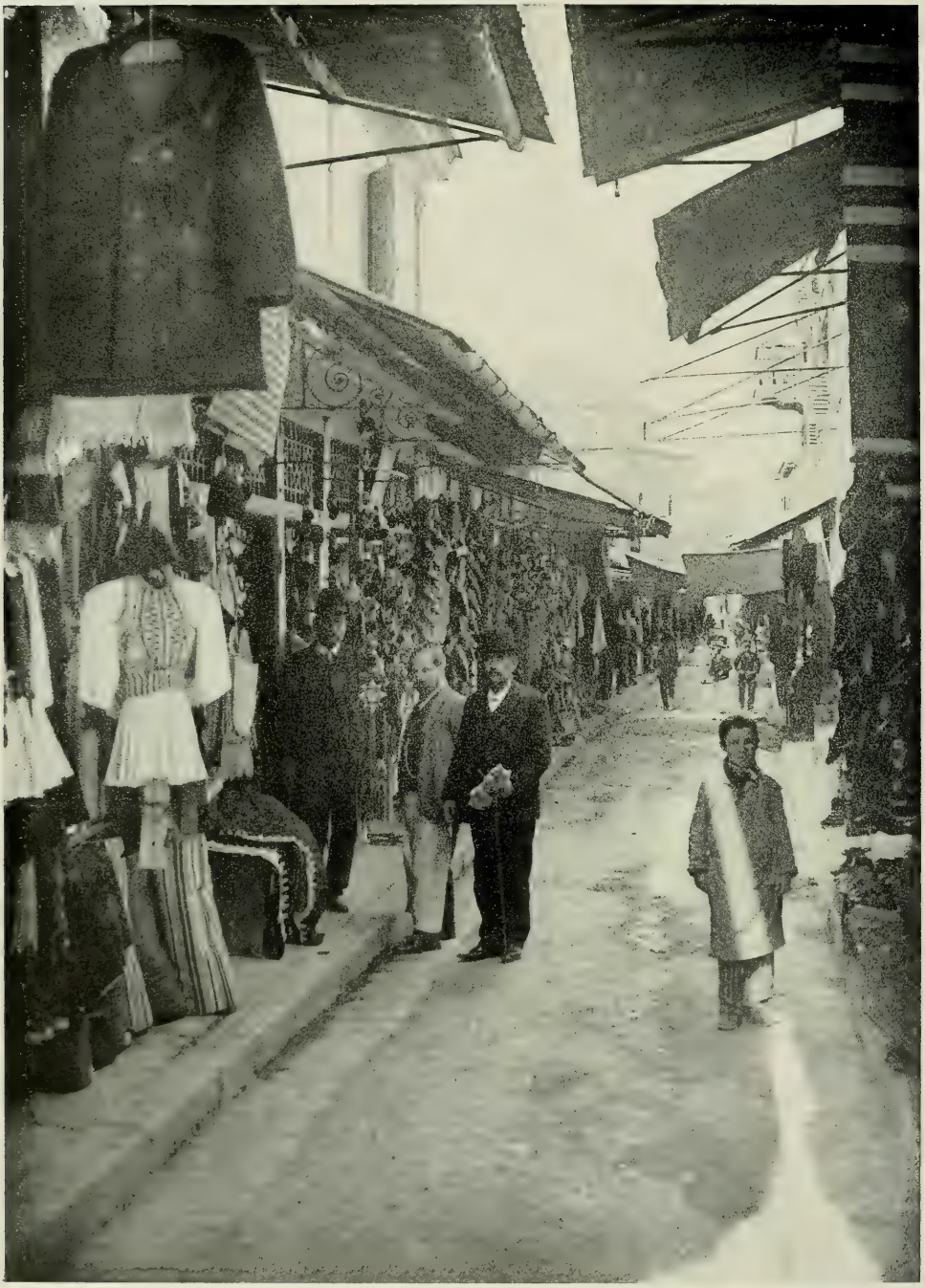
A MEDIÆVAL STYLE OF SHOE STILL IN USE

The footgear of the guard at the Tower of London is identical with that worn by their predecessors in the time of Henry VIII

Photo and Copyright by Underwood & Underwood, New York

RED LEATHER SHOES WITH HUGE POMPONS EMPHASIZING THE UP-TURNED TOES WORN BY THE QUEEN'S GUARDS IN ATHENS



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A STREET OF SHOE STORES IN ATHENS

Artisans and retail shop-keepers in Greece nearly always group themselves in this way by trades, instead of scattering so as to divide custom

Photo and Copyright by Underwood & Underwood, New York

A CHINESE SHOE STALL IN A CITY MARKET. THIS DEALER CATERS ONLY TO MASCULINE CUSTOMERS

Photo and Copyright by Underwood & Underwood, New York

TINY SHOES OF FINE KID AND SILK EMBROIDERY WORN BY CHINESE LADIES OF THE UPPER CLASSES IN CANTON

Photo and Copyright by Underwood & Underwood, New York

PROBABLY THE ODDEST SHOES IN THE WORLD, BEING A FLAT BLOCK WITH A LARGE KNOB WHICH SLIPS BETWEEN THE FIRST AND SECOND TOES

This shoe is worn by the low classes in India

Photo and Copyright by Underwood & Underwood, New York

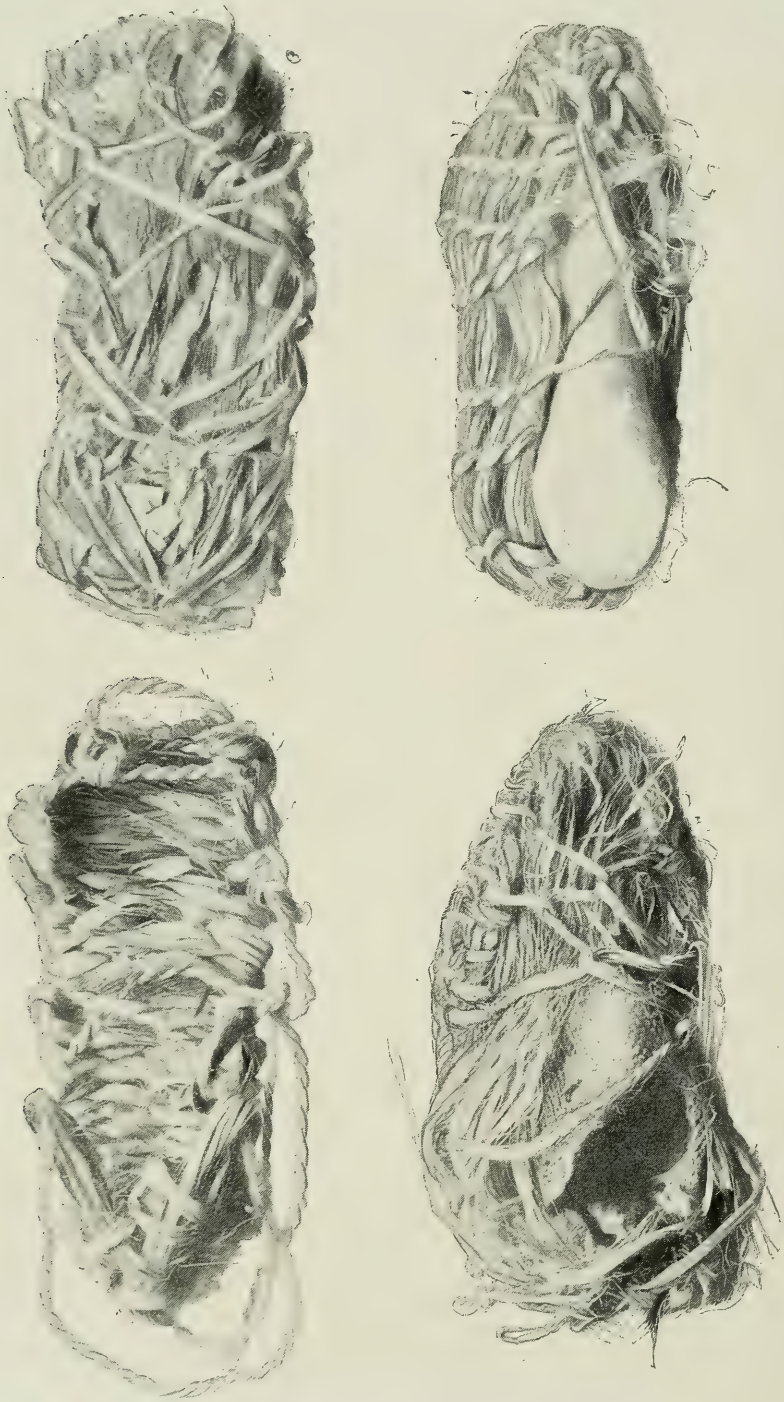
BARGAIN SALE OF JAPANESE CLOGS AND SANDALS AT A SHOP IN TOKYO

The sandals with straw soles cost only a few cents. The padded strap passes between the big toe and the rest of the toes. The wooden clogs, especially useful in muddy or snowy weather, are held in place by similar straps. This very slight attachment to the foot is practically necessary, as all shoes are removed on entering any temple, shop, or dwelling-house, even the humblest sort.

Photos by courtesy of the Regal Shoe Co.

DEPARTMENTS IN ONE OF THE LARGEST HIGH-GRADE SHOE MANUFACTORIES IN THE UNITED STATES

Cutting and fitting departments where the heels and soles are cut out by perfected machinery and linings are fitted and sewed to uppers. This establishment employs more than 4,000 skilled shoe workers.



FOOTGEAR OF ANCIENT CLIFF-DWELLERS, FOUND IN ARIZONA

Sandal with marginal loops for lacing the sole is made of yucca leaves six-ply, with an insole of corn husks

TEN YEARS OF THE PEARY ARCTIC CLUB

By Herbert L. Bridgman

Secretary of the Club, Read at the Ninth International Geographic Congress, at Geneva, Switzerland, July 27–August 5, 1908

ALTHOUGH the Peary Arctic Club has not yet fully completed its work, it willingly improves the opportunity of the Ninth International Congress to place in the permanent records of geographical progress a brief résumé of its history and deeds for its first decade. The Club, unique and unprecedented in organization and methods, was the product of circumstances, and, though designed for a special field and a definite task, has a charter of broad powers and permanent value. Founded and brought into activity as an ally and resource of Commander Peary in his quest for the North Pole, it has demonstrated by ten years of continuous, unceasing labor the efficiency of its organization and the wisdom of personal responsibility and direct connection between cause and effect. When its present work shall be completed its legal and chartered powers will continue in perpetuity, and its experience and prestige may be made valuable assets to its successors, no matter in what field, in what lands or seas, they may choose to prosecute exploration and discovery.

The times were ripe ten years ago for the Peary Arctic Club. The new expedition, prefaced by seven years of successful work in Greenland, had been sanctioned by the geographical authorities; leave from the public service had been granted; the *Windward* was on her way from England, and the date for departure approached. Already Peary had four times traversed the inland ice-cap of Greenland, and in the judgment of both American and Royal geographers demonstrated its insularity—a judgment ratified by gold medals from each society; the three great meteorites, Dog, Tent, and Woman, had been brought from their cradles; the Eskimo by kindness and humanity had been won to faithful and loyal alliance and, having had a year for preparation, were awaiting the arrival of their leader. The imperative need of the hour was an effective, responsible organization, which would provide the means and, not less important, organize and direct all the support and interest which might be developed among the American people. The original plan was twenty-five subscriptions of $1,000 each for four years, and with this list but partially filled, with the expectation that the vacancies would before long be made up and organization perfected, Peary sailed from New York July 4, 1898, on the *Windward,* and a few days later, accompanied by the auxiliary *Hope,* from Sydney, Nova Scotia. The ships parted August 12, off Etah, north Greenland, the *Windward* to winter in Allman Bay, the *Hope* to return to her home port, Saint Johns, Newfoundland. Both are now at the bottom, the *Hope,* lost in 1900, drifting helpless in a floe on a reef near the Magdalens, in the Gulf of Saint Lawrence, and the *Windward,* renewing the rôle of her early days, as a Dundee whaler, having been driven on a ledge near the Carey Islands June 15, 1907, sinking in the very waters which she had often traversed in safety. The *Eagle* (1886) and the *Falcon* (1892 and 1894), of the Peary ships, also lie now on the floor of the sea.

The subscribers supporting the expedition, upon which Commander Peary more than six months before had left for the North, met for the first time January 30, 1899—by chance, Friday—at 44 Pine Street, New York, and organized the Peary Arctic Club, electing as its president Morris K. Jesup, who held the office from that date until his death. A brief and succinct constitution was adopted, which set forth as the objects of the Club, "to promote and encourage

COMMANDER PEARY'S SHIP, THE "ROOSEVELT"

The first American ship built specially for Arctic exploration. She is now northward bound for the winter quarters of Peary's expedition on the north side of Grant Land

explorations of the Polar regions, as set forth in Lieut. R. E. Peary's letter to the American Geographical Society, dated January 14, 1897, and to assist him in the completion of the geography of the same; to receive and collect such objects of scientific interest or otherwise as may be obtainable through Lieutenant Peary's present expedition, or other expeditions of like nature; to receive, collect, and keep on file narratives and manuscripts relative to Arctic explorations; to preserve such records and keep such accounts as may be necessary for the purposes of the association; and, further, to command in its work the resources of mutual acquaintance and social intercourse."

Contributors to the Peary Expedition of 1898 were constituted founders of the Club, and the approval of a majority of them was prescribed as a condition of future membership. Alfred C. Harmsworth, Esq., now Lord Northcliffe, was elected, in recognition of his gift of the *Windward,* an honorary member, the only one the Club has ever had, and after formalities had been completed the work of the approaching season was thoroughly canvassed. Clear and unanimous agreement was developed from the beginning that an auxiliary steamer should be sent north during the summer to communicate with Commander Peary, to take sufficient stores and material to meet any emergency which should arise, and to demonstrate that the support of the Club was practical and efficient.

Preparations were actively prosecuted, and on July 21, 1899, the *Diana,* in charge of H. L. Bridgman, Secretary of the Club, and Capt. Samuel W. Bartlett, as master, steamed out of Sydney, Nova Scotia, for the North, having on board nearly fifty tons of supplies and equipment, filling requisitions of Commander Peary. It

was necessary to provide in the first place for the party of the *Diana* for at least a year, as her return, like that of all other Arctic-bound steamers, was uncertain; for the company of the *Windward* in case she should be met at the North, and to deposit for Peary and his party subsistence for at least two years. Nothing else would adequately meet the contingencies, which were further increased by the presence on the *Diana* of a party of Princeton University scientists, led by Prof. William Libbey and another sportsman, together with Robert Stein, of Washington, D. C., with two associates and supplies, who were landed at Payer Harbor, near Cape Sabine.

Etah was reached August 5, and on the next morning a characteristic letter and instructions from Commander Peary were taken from a bamboo pole, surrounded by rocks, on the summit of Littleton Island, the most northern post-office in the world. A week later junction was effected with the *Windward,* when her winter's imprisonment in Allman Bay and Commander Peary's mid-winter marches along the ice-foot of Fort Conger and his sufferings and disabilty from frost-bite were for the first time learned. The *Diana,* having gathered dogs and equipment from the native settlements and discharged her entire cargo on the rocky knoll of Etah, returned on schedule time to Sydney, and was followed a few days later by the *Windward* to Brigus, Newfoundland, where she was laid up for the winter.

Repairs having been effected, the *Windward,* with Mrs Peary and Marie Ahnighito Peary on board, was dispatched in July, 1900, from Sydney a second time for the North, from which came that season no returning word. Therefore, early in 1901, the Club began to bestir itself to discover the fate of its leader, then almost two years isolated, and of the *Windward,* from which nothing had been heard since departure from Sydney. The former Hudson Bay steamer *Erik* was chartered, dispatched July 18, 1901, from Sydney, and on the morning of August 5 steamed into Foulke Fjord, where she found at anchor the *Windward,* which a few days before had broken out of her winter ice prison at Payer Harbor, with Commander Peary, Mrs Peary and the entire party, American and native, on board. The following characteristic letter by Commander Peary, written on the chance that he might not meet the auxiliary ship, was delivered by him in person:

CONGER, *April* 4, 1901.

MY DEAR BRIDGMAN:

It gives me great pleasure to present to the Club the results of the work of 1900.

First. The rounding of the northern limit of the Greenland Archipelago, the most northerly known land in the world, probably the most northerly land.

Second. The highest latitude yet attained in the Western Hemisphere (83 degrees 50 minutes north).

Third. The determination of the origin of the so-called paleocrystic ice (floe berg), etc., etc.

Considering that I am an old man, have one broken leg and only three toes, and that my starting point was Etah, I feel that this was doing tolerably well. It is almost 1,000 years since Erik the Red first sighted the southern extremity of the archipelago, and from that time Norwegians, Dutch, Danes, Swedes, Englishmen, Scotchmen, and Americans have crept gradually northward up its shores until at last, through the instrumentality and liberality of the Club, its northern cape has been lifted out of the Arctic mists and obscurity. It seems fitting that this event, characterized by Sir Clements Markham as second in importance only to the attainment of the Pole itself, should fall in the closing year of the century. If I do not capture the Pole itself in this spring campaign, I shall try it again next spring.

My gratitude and respects to all the members of the Club.

Always most sincerely, PEARY.

Six weeks later the *Erik,* after a desperate struggle with the ice, prevented from reaching headquarters at Cape Sabine, landed Commander Peary and his party on August 26 in a temporary camp, in Herschel Bay, Ellesmere Land, whence he later marched to headquarters, and, followed by the *Windward,* returned to Sydney late in September.

The next year, 1902, the *Windward,* having received at Newburg, New York, new engines and boilers, and commanded by Capt. Samuel W. Bartlett, entered for

the third time the portals of Smith Sound, and on August 5, improving a fortunate few hours of open water, succeeded in embarking, at Payer Harbor, Commander Peary, homeward bound after four years' absence, and reached Sydney safely, with his comrades of 1898, on September 15, closing the first chapter and the definitive obligations of the subscribers, the founders of the Peary Arctic Club.

A season of rest, but not of inaction, followed. The work of the *Windward* and her power, or rather lack of it, having been demonstrated in serious Arctic work, the steamer was sold early in 1903 to a Norwegian purchaser, who later restored her, for a consideration, to owners in her native Scotland. Commander Peary, having secured in September, 1904, further leave of absence from the service to prosecute and complete the work of his life, immediately began preparations for the construction of a ship which could meet the difficulties and could perform the service and could break down the barriers which had so far stopped advance to the North.

Commander Peary's application for leave, and the correspondence incident to it, between him and the Department, are so characteristic, and present so fully and clearly his plans and purposes, and show so faithfully his methods of reasoning that, perhaps, the best idea of all may be gained from these extracts, here published for the first time:

DEPARTMENT OF THE NAVY,
BUREAU OF YARDS AND DOCKS,
WASHINGTON, D. C., *September 2*, 1903.

SIR: Referring to my application for leave of absence accompanying this, I beg to state for your information that I propose to secure a suitable ship, put her into one of our best ship yards, have her reinforced and strengthened to the maximum degree and fitted with American engines possessing the maximum of strength and power with the minimum of weight and space, so that she may go north as an exponent of American skill and mechanical ability.

With such ship I should sail north about the 1st of next July, and on reaching the Whale Sound region should take on board my Eskimos, establish my permanent sub-base at Cape Sabine, and then force my way northward to my proposed winter quarters on the northern shore of Grant Land, establishing caches as far as practicable en route. By the earliest returning light of the following February I should start due north over the Polar pack with a small light pioneer party, followed by a large heavy main party. I should expect to accomplish the distance to the Pole and return in about one hundred days or a little more, an average travel of about ten miles per day. Returning, I should break the ship out late in the same season and return home.

If ice conditions the first year were such as to prevent reaching the northern shore of Grant Land, I should winter as far north as practicable and force the ship to the desired location the following year. In this event the expedition would be gone two years.

This plan is the result of some twelve years of almost continuous experience in those latitudes, and is based upon an extended personal acquaintance with the region from Sabine to 84 degree north latitude and a thorough familiarity with climatic and other conditions and with the Eskimos.

The distinctive features of my plan are: The use of individual sledges with comparatively light loads, drawn by dogs, giving a traveling unit of high speed and radius of reach, as opposed to the man sledge, with its heavy load, slow speed, and limited radius; the adoption of Eskimo methods and costume, and the fullest utilization of the Eskimos themselves.

I beg to state for your consideration the following:

The North Pole is the last great geographical prize the earth has to offer. Its attainment will be accepted as the sign of man's final physical conquest of the globe, and it will always stand as one of the great milestones in the world's history.

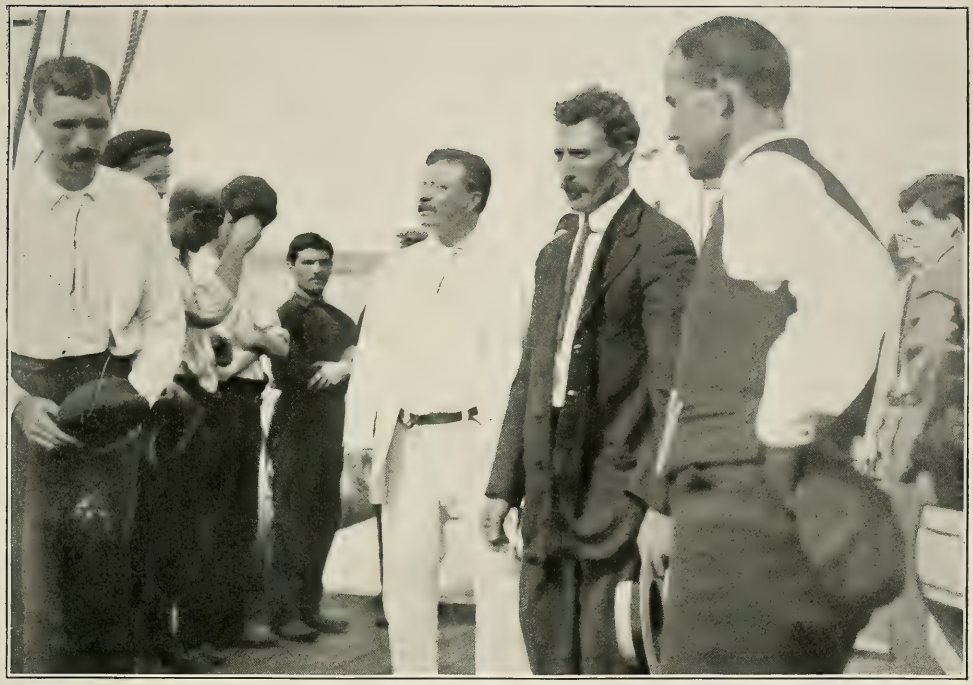
The attainment of the North Pole is, in my opinion, our manifest privilege and duty. Its attainment by another country would be in the light of a reproach and criticism.

The sense of all the foremost geographers—practical and theoretical—now converges upon the Smith Sound or American Route, along which I have been working for years past. Other routes have been eliminated. If we delay in preëmpting this route, some one else will step in and win the prize.

I believe that my experience, gained in years of practical work; my special methods of travel and equipment, the evolution of years of practical work; my personal acquaintance with every feature of my chosen route and region, and my command of the full resources and utmost efforts of the entire little tribe of Whale Sound Hyperboreans, who have lived and worked with me for years, give substantial reasons for anticipating a successful outcome to an expedition based on the above lines.

Respectfully,
(Signed) R. E. PEARY,
Civil Engineer, U. S. N.

To the SECRETARY OF THE NAVY.



THE PRESIDENT BIDDING "GOD SPEED" TO THE INTREPID CREW OF THE "ROOSEVELT"

NAVY DEPARTMENT,
WASHINGTON, *September* 5, 1903.

DEAR SIR: In granting you leave of absence for the purpose of prosecuting your Arctic work, I am moved to remark that I believe you are better equipped than any other person in the country to undertake this work. You have the requisite courage, fortitude, and physique. You have had a longer term of service within the Arctic Circle than any other explorer. You have had large experience in sledge journeying, both upon the land and upon the polar pack. You are familiar with ice conditions through the Smith Sound route and north of Grant Land and the continent. You have demonstrated your ability to maintain yourself in this latitude for a longer period in health and safety than any other explorer. You have reduced the inconveniences and hardships of Arctic service to a minimum. You are conversant with the language and customs of the Whale Sound Eskimo and are personally acquainted with every individual in the tribe. They have become accustomed to your leadership, and if you succeed in transporting the selected hunters and the best families to the north shore of Grant Land, as you propose, you will thereby establish a base which will enable you to live in safety and comparative comfort for an indefinite period.

Grant Land as such a base has great advantages over Spitzbergen or Franz Josef Land, or any other known point, in that it has an extensive shore line, which a party retreating from the Pole cannot fail to find, whatever may be the extent of the polar drift.

The attainment of the Pole should be your main object. Nothing short will suffice. The discovery of the poles is all that remains to complete the map of the world. That map should be completed in our generation and by our countrymen. If it is claimed that the enterprise is fraught with danger and privation, the answer is that geographical discovery in all ages has been purchased at the price of heroic courage and noble sacrifice. Our national pride is involved in the undertaking, and this department expects that you will accomplish your purpose and bring further distinction to a service of illustrious traditions.

In conclusion, I am pleased to inform you that the President of the United States sympathizes with your cause and approves the enterprise. With best wishes for your health and confidence in your success, I am,

Respectfully,
(Signed) CHARLES H. DARLING,
Acting Secretary.

ROBERT E. PEARY,
Civil Engineer, U. S. Navy,
Washington, D. C.

Plans were made for a ship which should combine the necessary qualities of power, the smallest consumption, and the largest capacity for coal, of a model which should withstand shock and pressure, which should surmount and crush floes, which should respond on call with full power of engines—in short, a ship which should be the product of actual experience. The keel of the new steamer was laid late in the fall by Capt. Charles B. Dix, in a Bucksport, Maine, yard, and on March 17 the *Roosevelt,* christened by Mrs Peary, was launched. Engines and boilers were installed at Portland in June, and on July 4, 1905, amid cheers and whistles and the waving of flags and signals, the *Roosevelt,* first American Arctic vessel for more than a generation, steamed out of New York harbor for the North.

Sixteen months later a wireless message informed the world that the *Roosevelt,* having wintered farther north than any ship in the Western Hemisphere, was at Hopedale, Labrador, crippled and short of coal, Commander Peary having attained 87.6°, a new "nearest the Pole," and all on board well. A month later, and after a slow, difficult, and laborious voyage, the *Roosevelt,* entering New York Harbor by its East River gate, was towed to her old anchorage at the foot of West Forty-second Street, and the expedition of 1905–1906 was ended.

Coincident with the construction of the *Roosevelt* and profiting by experience, the Peary Arctic Club was incorporated April 25, 1904, under the laws of the State of New York, with larger powers, greater efficiency, and other advantages. The definite business of the new organization, of which Morris K. Jesup, John H. Flagler, Anton A. Raven, Henry Parish, Herbert L. Bridgman, and Robert E. Peary were incorporators, was stated in the charter to be "To aid and assist in forming and maintaining certain expeditions to be placed under Commander Robert E. Peary, U. S. N., with the object of continuing his explorations of the polar regions and his completing the geographical data of the same; receiving and collecting such objects of scientific interest as may be obtainable through such expeditions; collecting, receiving, and preserving narratives and manuscripts relating to Arctic exploration in general; soliciting and administering funds for the maintenance of such expeditions, and in general providing funds for Commander Peary's efforts to reach the farthest northern point on the Western Hemisphere, and to cooperate with any other assistant for the same purpose."

It is not the purpose of this paper to speak in detail of the field work of the Peary Arctic Club; that belongs of right to the man who did it; but it may be proper to present here a brief résumé, or a statement of net results on the sea, ice, and land.

Fourteen times the ships of the Club have traversed boisterous Davis Straits, conquered Melville Bay, and established Sydney–Etah service with almost the regularity of transatlantic liners. The total mileage of these voyages, not including the fifteenth, upon which the *Roosevelt* is now engaged, would be probably not far from 50,000 miles, or sufficient twice to circumnavigate the globe; of the eight ships, one-half have met their fate (after passing out of the Club's service), but among officers and crews, more than one hundred in all, except the ill-fated *Falcon* and her company (also after her Arctic voyage was finished), no loss of life or serious accident has occurred.

A summary of the cruises of the Club's steamers is as follows:

1898. *Windward,* London to New York, to Allman Bay; *Hope,* Saint Johns to Sydney, to Etah, to Saint Johns.

1899. *Diana,* Saint Johns to Sydney, to Etah, cruise in Inglefield Gulf, to Sydney, to Saint Johns; *Windward,* Allman Bay to Brigus, N. F.

1900. *Windward,* Brigus, via Saint Johns, to Sydney, to Payer Harbor, Ellesmereland.

1901. *Windward,* Payer Harbor to Saint Johns; *Erik,* Halifax to Sydney, to Etah and return.

1902. *Windward,* Saint Johns to Newburgh, N. Y., to Cape Sabine, to Sydney, to Brigus.

COMMANDER PEARY AND HERBERT L. BRIDGMAN, SECRETARY OF THE PEARY ARCTIC CLUB, SAYING FAREWELL ABOARD THE "ROOSEVELT"

1905. *Roosevelt,* Bucksport to Portland, to New York, to Sydney, to Cape Sheridan and winter quarters.
1906. *Roosevelt,* winter quarters, Cape Sheridan to Sydney and New York.
1908. *Roosevelt,* New York to Sydney and winter quarters.

Of the sledge and field work of the Club, it so far exceeds that of any other expedition that it may be fairly questioned whether it does not equal that of all combined. Six times along the ice-foot from Cape Hawkes to Fort Conger its sledges broke the way, until it resembled an open road, while Smith Sound, Robeson Channel, and Lincoln Sea were gridironed in all directions with their trails.

On the Greenland coast, delimiting for the first the northern boundary of this mysterious continent, it fixed Cape Morris K. Jesup in 1900, the highest northern land in the Western Hemisphere, and probably connected farther to the east the new land with Independence Bay, discovered by Peary six years before. The game located on this former journey also proved the salvation of the party upon their return from the farthest north, six years later. From Fort Conger north to Cape Hecla, from Cape Sheridan west, in the summer of 1906, the ice-foot afforded a path to the farthest west, whence the hitherto-unknown Crocker Land was visible, and the definite map of the Arctic Archipelago still farther extended.

Of the memorable sledge journeys across the polar pack, that of 1902, to 84.17°, highest north on the American Hemisphere, and that four years later to 87.6°, the highest north, the leader has the rightful prerogative of description; but they are recognized as among the major achievements of Arctic annals, not only in latitude attained, but in possession and exercise of those qualities which are the price of all Arctic success. The total number of miles covered by the

sledges of the Peary Arctic Club during its ten years of field work is not less than 6,800 miles.

Additions by the Club to the nomenclature of Arctic maps may be summarized as follows:

1899:
Jesup (Morris K.) Land.
Moore (Charles A.) Mountain.
Bridgman (Herbert L.) Mountain.
Benedict (Erastus C.) Glacier.
Hedin (Sven) Glacier.
Cannon (Henry W.) Cape.

1900:
Jesup (Morris K.) Cape, 1883-1890.
Bridgman (Herbert L.) Cape.
Parish (Henry) Cape.
Wyckoff (Clarence F.) Cape.
Hill (James J.) Cape.
Cannon (Henry W.) Cape.
Benedict (Henry H.) Mountains.
Daly (Charles P.) Mountains.
Constable (James M.) Bay.
Wyckoff (Edward G.) Island.
Schley (Grant B.) Fjord.
Hyde (Frederick E.) Fjord.
Sands (Hayden H.) Fjord.
Peary (Mary) Peak.
McKinley (William) Sea.
Roosevelt (Theodore) Range.

1906:
Crocker (George) Land.
Phillips (John C.) Bay.
Bourne (Fred. G.) Cape.
Colgate (James C.) Cape.
Hubbard (Thomas H.) Cape.
Kleybolte (Rudolph) Island.

In addition to its definite work on the map of the world, the Peary Arctic Club has accomplished other things hardly less important and significant. It has demonstrated the indisputable value of the Eskimo and his dog; has substituted for strained relations, friendship and loyalty, sympathy with the leader and obedience to him, so that the undertaking commands the best resources of both races; each supplements the other, and the result has demonstrated the merit of the combination. The Club has also vastly simplified the equipment and dietary of explorers; has carried far beyond any former example the rule of "living off the country." Scurvy and other evils which enfeebled and reduced earlier explorers have been practically unknown, and, utilizing the abundant supplies of the food of the country, combined with the essentials, pemmican and tea from civilization, have demonstrated what is probably the ideal Arctic food supply. Starvation upon a selected basis has been practically eliminated from the Arctic dangers.

The Peary Arctic Club has also demonstrated the advantage of a small, compact organization with direct personal responsibility, free from routine "red tape" or the semblance, without the fact, of authority. Animated by absolute sincerity of purpose, by undivided earnestness in its one great object, it believes that its example in fields of administration and coöperation are not less instructive than its achievements in the field are gratifying.

Death removed from the Club, on January 22, 1908, Morris K. Jesup, its first and only president. To Mr Jesup more than to any other man the Club owed existence, and from him it received in generous measure support, counsel, and inspiration, which sustained its work and commanded for it a definite place in public confidence and respect.

The vacancy caused by Mr Jesup's death was filled June 18, 1908, by the election of Gen. Thomas H. Hubbard, of New York, and that in the vice-presidency, by the resignation of Commander Peary, on account of his approaching departure for the North, by the election of Zenas Crane, of Dalton, Massachusetts.

The Club's steamer *Roosevelt,* fully repaired, equipped with new boilers, stronger and better than ever, left New York for the North, a second time, July 6, 1908; and, having been honored at Oyster Bay, New York, by a visit from President Roosevelt, departed from Sydney July 17, upon a quest the complete success of which the Club confidently expects Commander Peary will report in person to the Tenth International Geographic Congress.

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THE PACIFIC MONTHLY, of Portland, Oregon, has just purchased, for $7,000, "Jack" London's new novel, "Martin Eden." It is 142,000 words in length, and is a vivid picture of London's struggle from obscurity to success. Probably there is not a reader of the National Geographic Magazine who has not read and been thrilled by "The Call of the Wild" and the "Sea-Wolf." Every man who has red blood in his veins will read London's latest story with intense interest.

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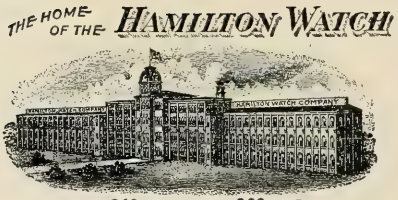

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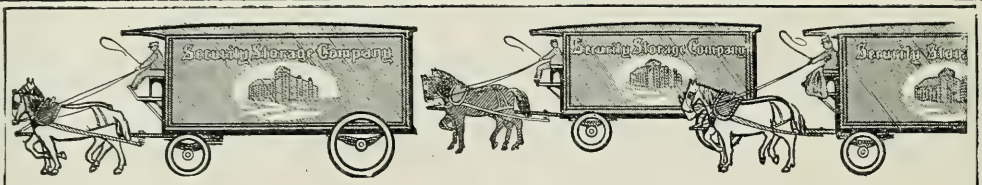

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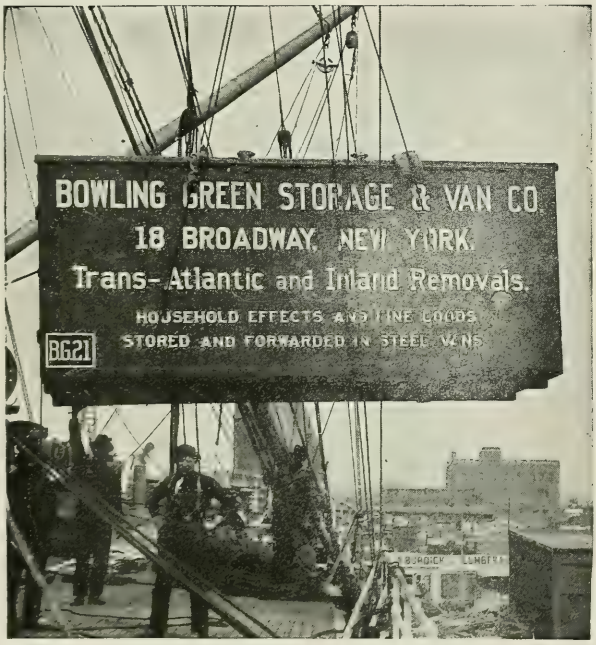
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THE NATIONAL GEOGRAPHIC MAGAZINE

CUZCO, AMERICA'S ANCIENT MECCA

BY HARRIET CHALMERS ADAMS

AUTHOR OF "ALONG THE OLD INCA HIGHWAY," "WONDERFUL SIGHTS IN THE ANDEAN HIGHLANDS," ETC.

WE all have a Mecca. It is New York, for one; for another, Paris. Some people long to reach the Holy Land. Since childhood I had journeyed in my dreams on the long pilgrimage to Cuzco, and when I at last found myself in the Andean country, on that portion of the old Inca highway stretching from Lake Titicaca to the "City of the Sun," I knew that dreams sometimes come true.

Through legendary and historical lore, I recalled the many wayfarers who had gone before me—Manco Capac and Mama Occla, his wife, missionaries of the Sun, on their way to found the Sacred City; Inca Emperors, returning from conquests far to the east and south; Spanish *conquistadores,* bearing the sword and the cross; brave warriors of the revolutionary days when Peru threw off the Spanish yoke; countless soldiers of the civil wars; and, in contrast to these pageants, the simple, unchanging mountaineers, driving townward their laden llamas, bowing their heads in worship of Cuzco the Sacred, as their Mecca came into view. The last link in that branch of the Southern Railway of Peru which will connect Cuzco with the coast is nearing completion, but I am glad that I entered Cuzco in the old way. For hundreds of years it has been the goal of the Andean people, who still journey miles on foot over the bleak highlands to reach its shrines and its mart.

Come and stand with me on the hill of Sacsahuaman, overshadowing the city, and look down through my Memory's field-glass. The old town, you see, lies just at our feet at one end of an oblong valley bordered by treeless mountains—a golden valley with cultivated patches on the hillsides shading into brown. This is the central vale in a group of fertile highland basins eleven thousand feet above the sea, sheltered by mountain walls from the bitter wind which sweeps along the elevated table-land of Peru. Situated in the heart of the former Inca Empire, "Cuzco" signifies "navel" or "center" in *Quichua,* the indigenous tongue.

The buildings, you notice, are Moorish in architecture, with slanting roofs of weather-stained reddish-brown tile. The paved courts which they encompass and the carved wooden balconies overhanging the narrow streets are typical of the Colonial period. Those open spaces

STATUE OF MANCO CAPAC, THE INCA EMPEROR WHO FOUNDED CUZCO

REMAINS OF THE PALACE OF THE FIRST INCA, MANCO CAPAC, THE FOUNDER OF CUZCO

throughout the town are plazas, and facing the largest one are the Cathedral and the Church of the Jesuits; the latter has a most beautiful façade. It is certainly a city of belfries. Many of the sweet-toned bells you hear were brought over from Spain in the sixteenth century.

Not a vehicle is in sight. Those snail-like green objects on the streets are burros, ears and all hidden by the fodder they are carrying. Look at these strange little animals coming up the hill. "Bus-ss ss! Bus-ss ss!" the driver is shouting. That means, "Get up, old slow pokes! It's a long way home across the mountains!" The queer little creatures are llamas, Peruvian camels, and the homespun bags which they carry, panier-wise, were woven from their own wool. The great white mushrooms down there in the main plaza are really circular awnings. Under them the market women sit, surrounded by their wares. Only at this distance can we enjoy the many picturesque little streams flowing through the streets. When we descend we find that they are the open sewers of a city which rivals Constantinople in unpleasant odors—in fact, I believe Cuzco holds the world's record.

Those villages beyond the town are San Sebastian and San Geronimo. There is a legend hereabouts that people of royal blood were allowed to retire to these hamlets after the Conquest. I doubt it. It seems far more likely that the Spaniards did away with most of the Inca princes and married the unwilling princesses. If that great snow peak beyond the hills could speak we would know the true story; it is Mount Azungato, rising from the majestic *Cordillera de los Andes,* and it stood there even when a pre-Incasic people inhabited this land.

From up here on the heights Cuzco looks old, with hardly a modern touch, but to realize its great antiquity we must go down to the streets or turn and study the hoary fortress crowning the hill on which we stand.

I shall never forget my entrance into

A MOUNTAIN TRAIL OVERLOOKING THE VALLEY OF CUZCO

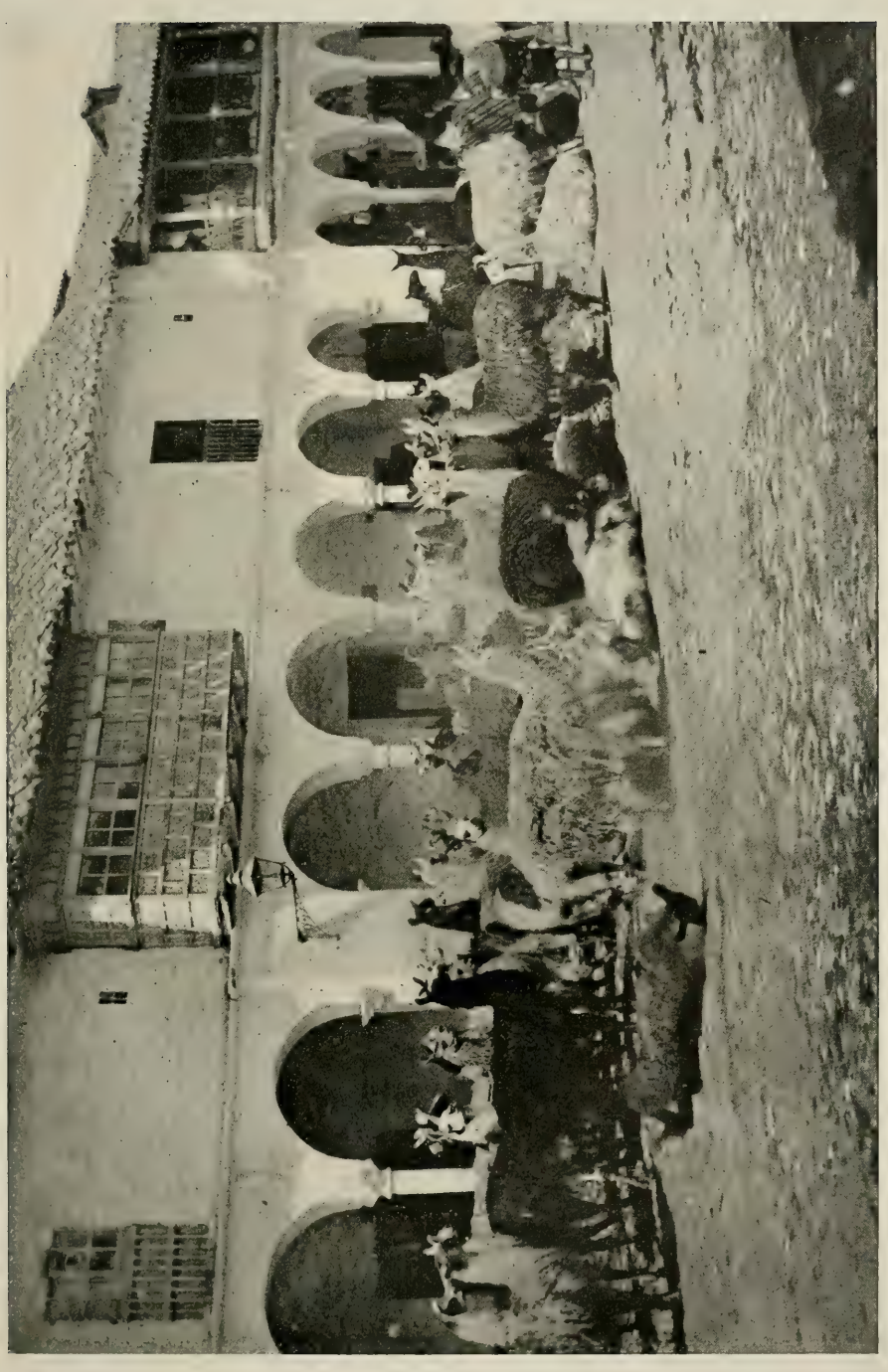
Cuzco. Arriving at the coach station in a suburb of the city, Mr Adams and I were informed by our *cholo* (half-breed) driver that vehicles were not allowed "on the streets of the metropolis." We argued in vain, and twilight fell as we trudged along the rocky road to town, loaded down with innumerable bags, boxes, and cameras. We surely had little to look forward to in an Andean hotel.

A British traveler tells of a time when he was arrested on entering a highland town of Peru, mistaken for an embezzler who had escaped from Lima. He spent some days in the local jail before his identity was established. Then he was released, with many apologies, and allowed to proceed to the hotel. After looking the place over hurriedly he returned to the jail, and asked permission to occupy his old quarters during the remainder of his stay.

There are several hostelries in Cuzco, and we "took a chance" at the "Hotel del Comercio," facing the Plaza de Armas. It had the reputation of being the best hotel in the town, but we paid only two *soles* (one dollar) each a day for room and board. The court-yard was strewn with rubbish and the room assigned to us had canvas partition walls extending only half way to the ceiling—quite a neighborly idea! The room was dirty and cold and the less said about the table the better. However, we put up with discomforts without complaint, finding so much in compensation.

It is such an interesting and picturesque old city. Cartegena, Colombia, has second place with me among the many romantic cities of Latin America, but *Cartegena de los Indies* has not the prehistoric interest of Cuzco and lacks its unusual types.

The morning after our arrival a rag-



A CUZCO STREET SCENE SHOWING OLD SPANISH BALCONY: NOTE THE LLAMAS ROLLING IN THE DUST

NEAR CUZCO

ged, unkempt *Mozo* brought chocolate and bread up to our room. This early meal is called *desayuno*. Cuzco chocolate is rich and sweet, with a dash of cinnamon, and is made from native cocao. As is the custom throughout the southern republics, breakfast (*almuerzo*) was served at half-past eleven, and dinner (*comida*) at six. We went daily to the market to buy fruit, and although the city is situated two miles above sea-level, its market is filled with tropical and semi-tropical fruits from the Santa Ana and other valleys in the lowlands. Burros, the little slaves of Latin America, bring the produce to town over the steep mountain trail. Among the many varieties of fruit for sale in the market are bananas, oranges pineapples, figs, paltas (alligator pears), sapotas, pomegranates, and chirimoyas.

This market place is one of the unique features of the city. Here the country people gather, selling to the merchants (usually women), who sit on the ground under shelters, their wares spread out on blankets. The ladies of the town come early to buy the day's provisions, followed by their servants carrying native baskets. The *señoras* have sweet, pale faces and large dark eyes. Their heads and shoulders are draped in black *mantos*, their black skirts trailing. They are of Spanish blood, but many have an Indian strain, and all can speak the *Quichua* language, taught them by their nurses and now used when conversing with the servants.

The costume of the Indians is most picturesque. Both men and women are bare-legged and wear sandals of llama hide. The men are clothed in knee-breeches and woolen ponchos; the women in low-cut blouses and short skirts. Both sexes wear great cart-wheel hats, a rich blue in shade, lined with red, and

FAMILIAR FACES IN CUZCO

trimmed with gilt or silver braid. The poor creatures have a sorrowful expression and really have little to "cheer over" excepting on the numerous *fiesta* days; then they drink large quantities of *chicha,* made from fermented corn, and become very hilarious.

The decorated street shrines, church processions, and the like are little more than a game to these simple Andean children. It is doubtful whether any form of religion could have as deep a meaning to them as had the ancient worship of the sun to their ancestors. Few, I believe, can see farther than the gorgeously decked altars, the pageant of marching Indian bearers, carrying great platforms on their shoulders, supporting images of the Virgin and the Saints. These images are carried from the many churches to the Cathedral, where they remain for a visit of several weeks before being returned to their respective homes. The original Virgin of the city was presented to Cuzco by Charles V of Spain. The figure is adorned with gold and precious stones and when carried in the procession stands on a pedestal of solid silver.

Only "a good bringing up" saved me from walking off with the Inca relics in one of the churches, ornaments wrought by the conquered Peruvians to beautify their Temple of the Sun. The present church of Santo Domingo stands on the foundation of this venerable temple, and throughout the old part of the city are many remains of the ancient capital in massive walls, doorways, aqueducts, fountains, and terraces. Most imposing are the walls.

I recall one street that is especially narrow; little more than an alley, in fact; the sidewalks are merely flagstones. On either side rise mighty walls, forming the foundations of Spanish structures. These walls are twenty feet in height, composed of massive stones, a dark slate color, irregular in size, rough on the surface. On all sides not exposed the stones were accurately cut, fitting perfectly. No mortar was used, yet the walls have stood through the centuries and will outlive the sixteenth century buildings which rise above them. The stones vary in length from one to eight feet, in thickness from six inches to two feet, the

A FOUNTAIN IN CUZCO

larger at the bottom, graduating as they rise. In comparison the Spanish edifices look crude and decayed. There is a strength and dignity in this work of the ancients. As I walked through the narrow street I felt very insignificant. The cyclopean stone-work well suits its environment. In the shadow of the mighty Andean mountains the Moorish style of architecture, transplanted from the sunny valleys of southern Spain, looks very much out of place. The most remarkable fact concerning these stones is that the quarries were many miles from Cuzco. Without iron or steel to shape them, with no device now known to us to aid in their transportation, these huge rocks were carried great distances by men over steep mountain trails.

Much larger than any of the stones to be seen in the city are those in the fortress of Sacsahuaman. Dominating the valley, the hill on which this fortress stands rises to a height of about seven hundred feet. In *Quichua,* "sacsā" means "gorge thyself;" "human" is "falcon" or "hawk." A noted American traveler who visited Cuzco in the sixties interprets the name somewhat like this: "Advance, O mine enemy! Dash thyself against the rocky and impregnable fortress, if thy wilt; the hawks will gather up thy fragments."

We climbed up the hill by a zigzag trail, very steep and rocky, past the ancient terraces of Colcompata, on which are the remains of the palace of Manco Capac, the first Inca. On the brow of the hill now stands a great cross, a reminder to the people below that the days

THE PLAZA, CUZCO, SHOWING A PROCESSION FROM THE CATHEDRAL

Each church sends its saint to the Cathedral for Corpus Christi. Here the saints remain one week, being then returned to their home church, after visiting other friendly saints

of sun-worshiping are past. Formerly three gigantic rows of masonry encircled the hill at its summit; now these walls are broken in many places. The greater portion of the stones facing the city were rolled down the hill and used in building the Spanish churches. The strongest enforcement was on that side of the hill farthest from the city. Here there is an open plain covered with a field of wheat. The citadel facing this tableland is composed of walls averaging 18 feet in height, built in over twenty salient and retiring angles. One of the rocks in the lowest wall is fully 16 feet in height and weighs many tons. In no part of the world is there an ancient building or fortification to equal Sacsahuaman in solidity and beauty of execution. Yet with the coming of the Spaniards it did not fulfill the glory of its name.

The story of that great contest has been immortalized by Prescott. As I stood in the door-way where Juan Pizarro, a brother of the conqueror, fell, and looked toward the precipice over which the defeated Inca noble hurled himself when he saw that his enemies were victorious, I realized how accurate is the great historian's description of a place which he had never seen.

On the plain facing the fortress is a mass of rock called the Rodadero and on the summit a series of seats rise one above the other. These are cut out of the hard rock and the place is called "The Seat of the Inca." According to tradition, the Inca and his nobles came here

THE ORIGINAL VIRGIN OF CUZCO IN THE CHURCH OF BEBEN

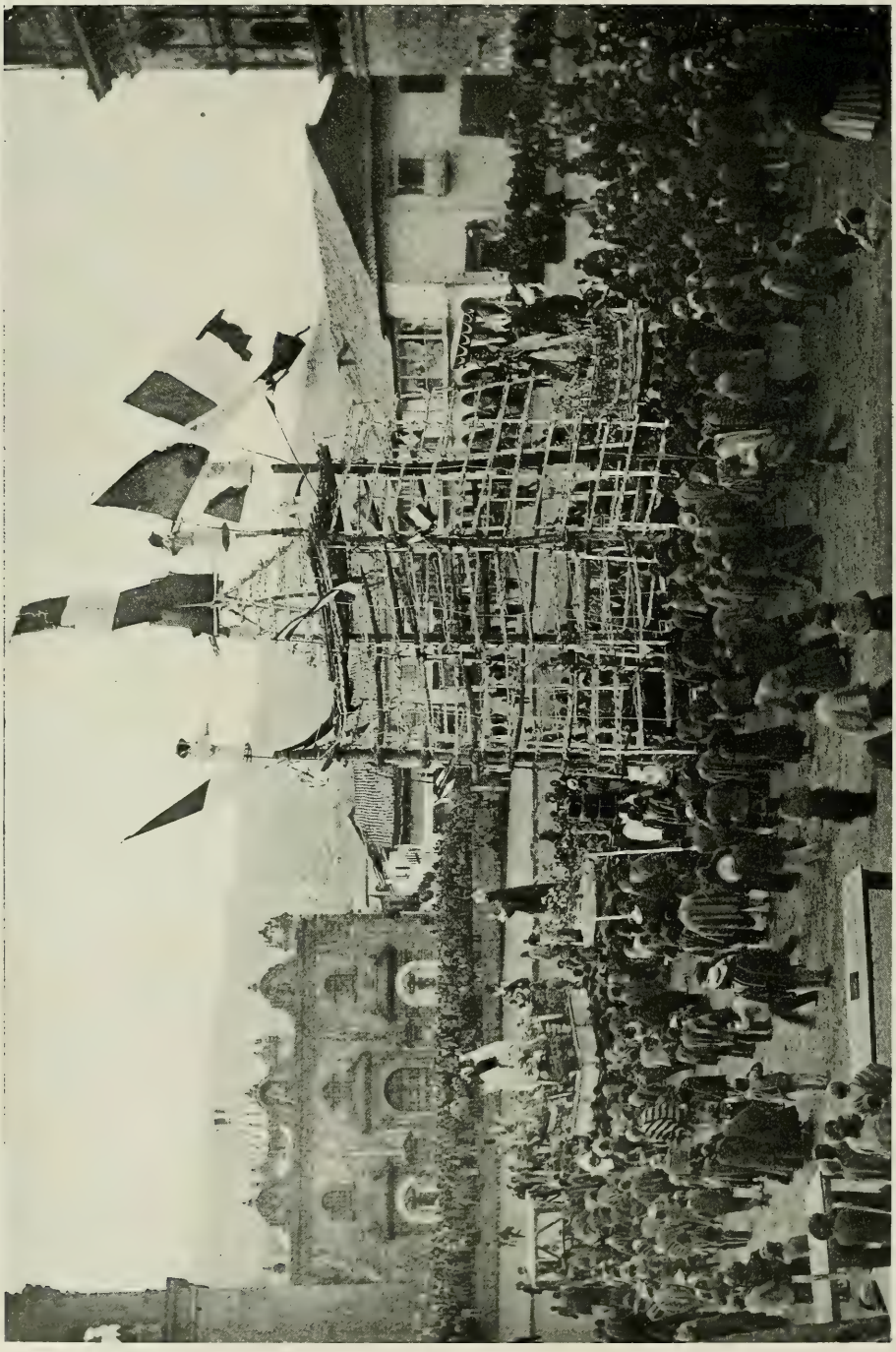
This saint when used in processions is carried on a solid silver pedestal, and was sent to Cuzco in the sixteenth century by Charles V of Spain

A STATIONARY SHRINE IN A CUZCO STREET

On feast days hundreds of these shrines adorn the streets and are visited by processions of priests, followed by Indians full of the native drink *Chicha*. These shrines are often simply bed spreads with spangles.

to watch the building of the fort, but legends and opinions of archæologists do not agree. It is a question whether Sacsahuaman was built by Inca rulers following Manco Capac or by a pre-Incasic people between the Tiahuanaco and Inca periods.

At this late day there is a newly awakened desire among the Peruvians to preserve and cherish within their own domain the relics of their forefathers. A law has been passed to the effect that no more Inca treasures shall leave the country. There is a private museum in Cuzco, which we visited. The Colonial exhibit is most interesting, including swords of the *conquistadores,* silver stirrups, trappings, and ornaments of all kinds, so plentiful in vice-regal days when thousands of the conquered Indians slaved



A RELIGIOUS PROCESSION IN CUZCO

TWELVE-SIDED STONE IN CUZCO, IN OLD INCA WALL

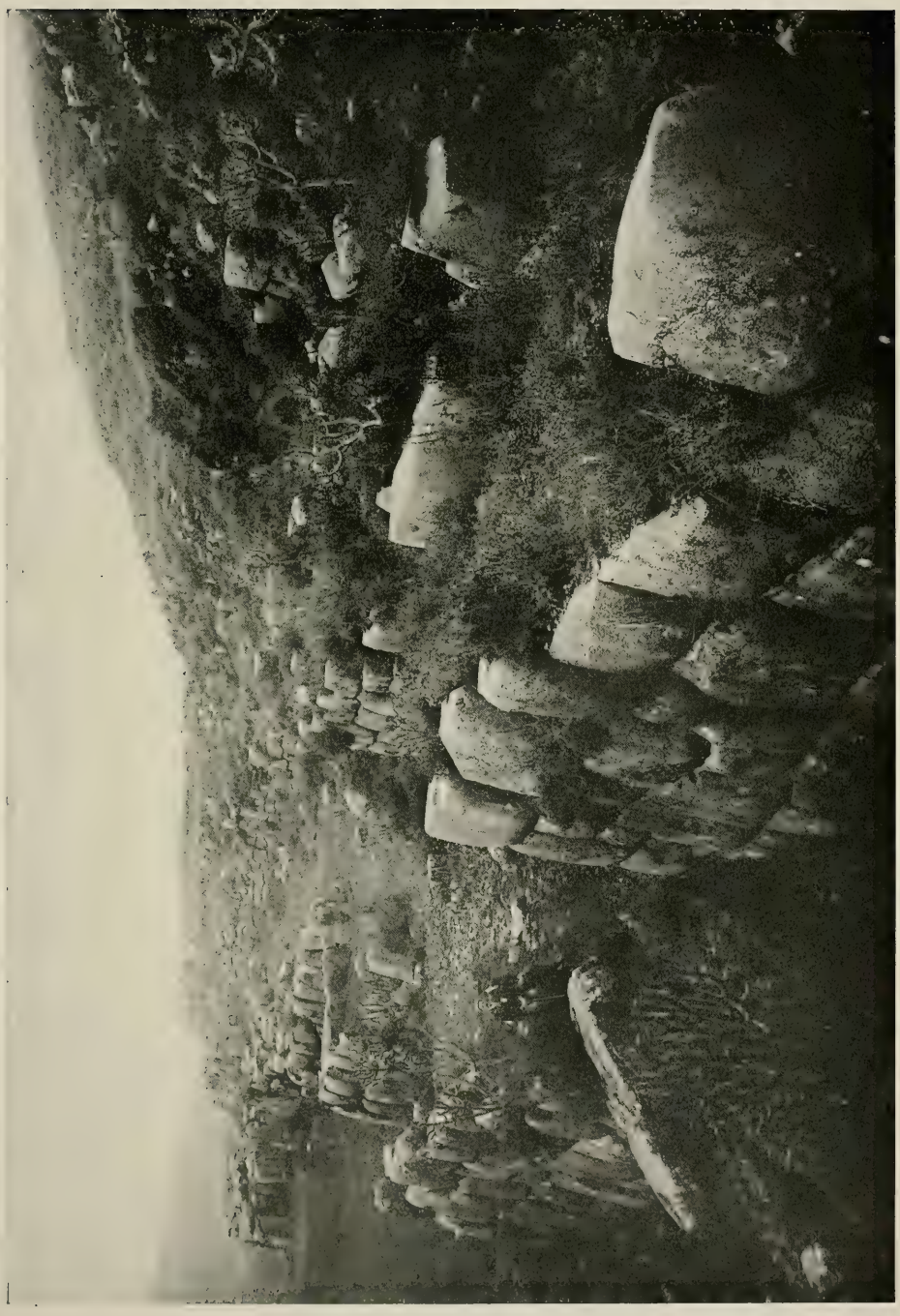
Note how stones are fitted together without mortar (see page 675)

for the Spaniards in the famous silver mines of Potasi. The carved chairs and chests, tapestries, and altar cloths recalled to us the days when Cuzco was the seat of Roman Catholic power, the proud capital of the Colony.

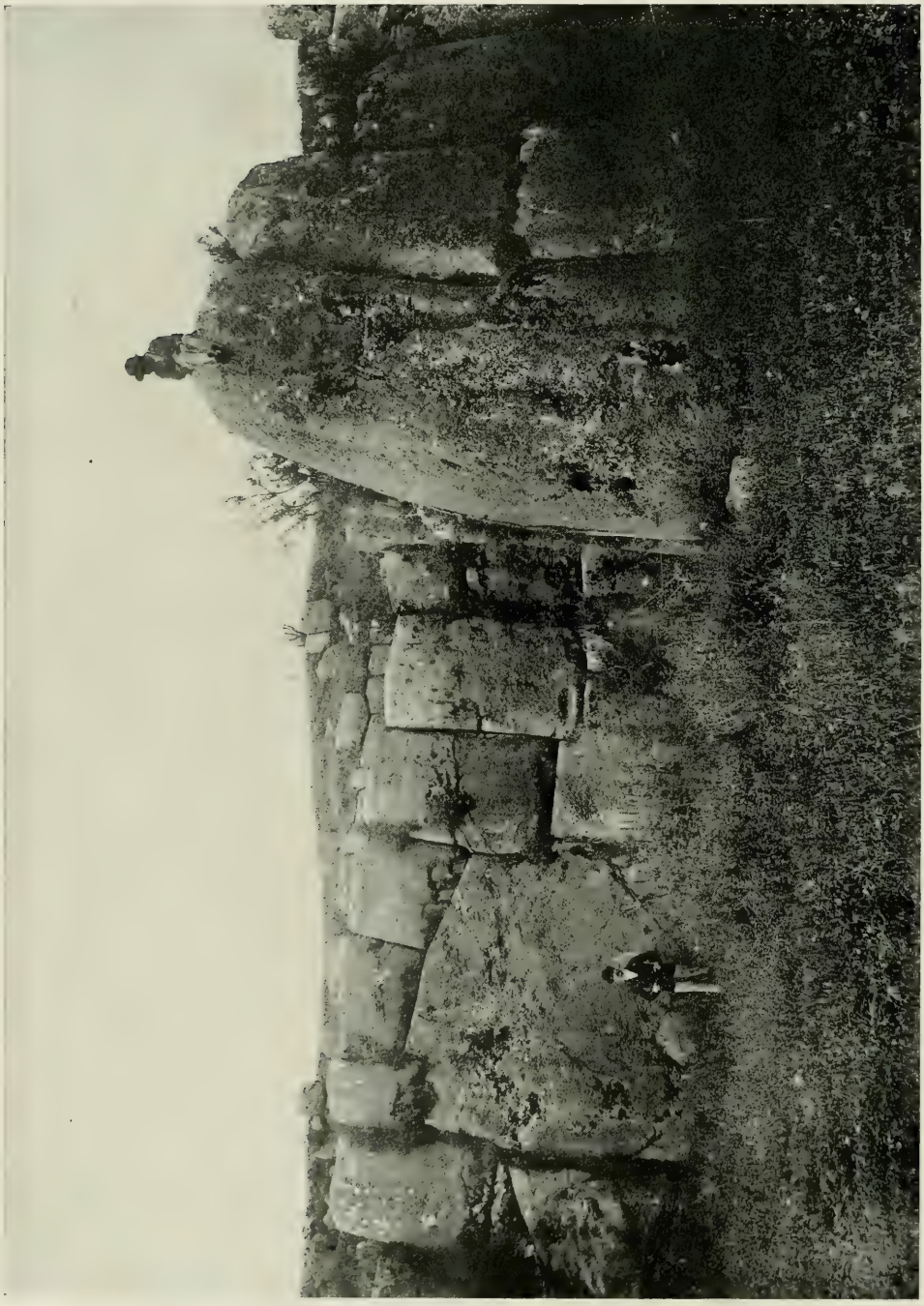
For many years following the conquest it was the most important city in Peru. Here lived the people of wealth and culture. The Spaniards, however, neglected the roads built under Inca régime, and as the highways fell into decay the difficulties of the long journey across the mountains to the coast increased. Gradually Cuzco's power slipped away, and Lima became the capital and pulse of the country, as it has ever since remained. Today comparatively few Limanians visit the southern highlands, and until the oncoming of the railroad Cuzco lay in a Rip Van Winkle sleep.

Overshadowing the Museum's relics of early Spanish days are the Inca treasures, which tell us of a people who left no written history. Until the arrival of priestly Spanish scholars, *Quichua* was an unwritten language. We learn much of the race, however, from the objects found in the tombs, since their dearest possessions were buried with them. There are implements of the war and the chase; *quipus* or fringes used in counting; prayer-sticks; musical instruments (reed-pipes, flutes, drums, bells, rattles, and cymbals); gold, silver, and copper ornaments; *chumpe* (copper and gold) implements used in the quarries; many varieties of pottery, including immense

A STREET OF CUZCO, SHOWING THE ANCIENT INCA WALLS UPON WHICH DWELLINGS HAVE BEEN BUILT



A VIEW OF THE FORTRESS OF SACSAHUAMAN, BUILT BY THE INCA RULERS TO PROTECT CUZCO (SEE PAGE 677)

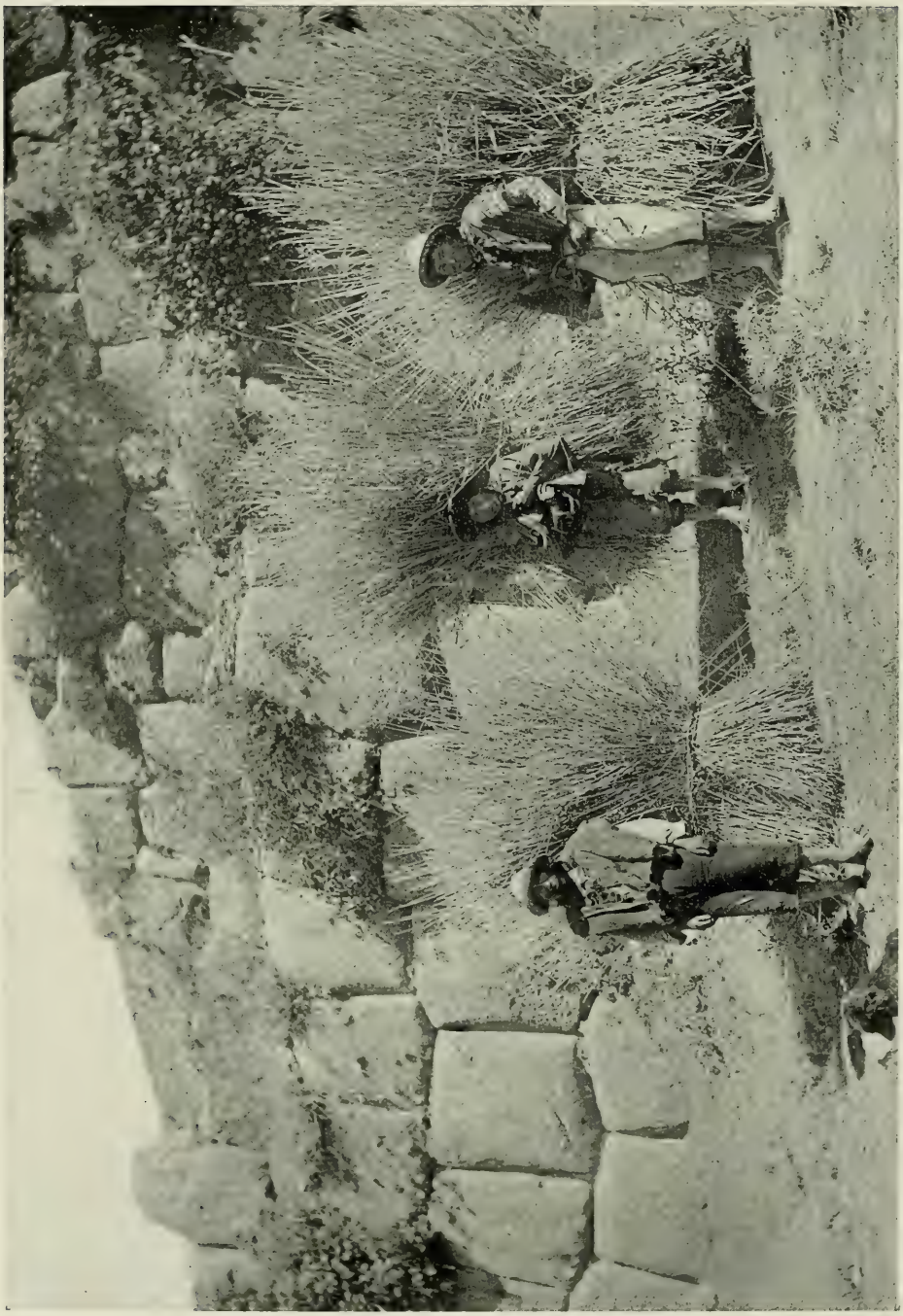


A VIEW OF ONE OF THE SALIENTS OF THE FORTRESS OF SACSAHUAMAN

Showing the enormous blocks of stone used in its construction. These great stones were brought from quarries miles away in the mountains

SEATS OF THE INCAS OVERLOOKING SACSAHUAMAN, CUZCO, CARVED OUT OF THE SOLID ROCK

They are supposed to have been occupied daily by the rulers and suites during the construction of the fortress



GATHERING FUEL

QUICHUAS: LAST OF THE INCAS

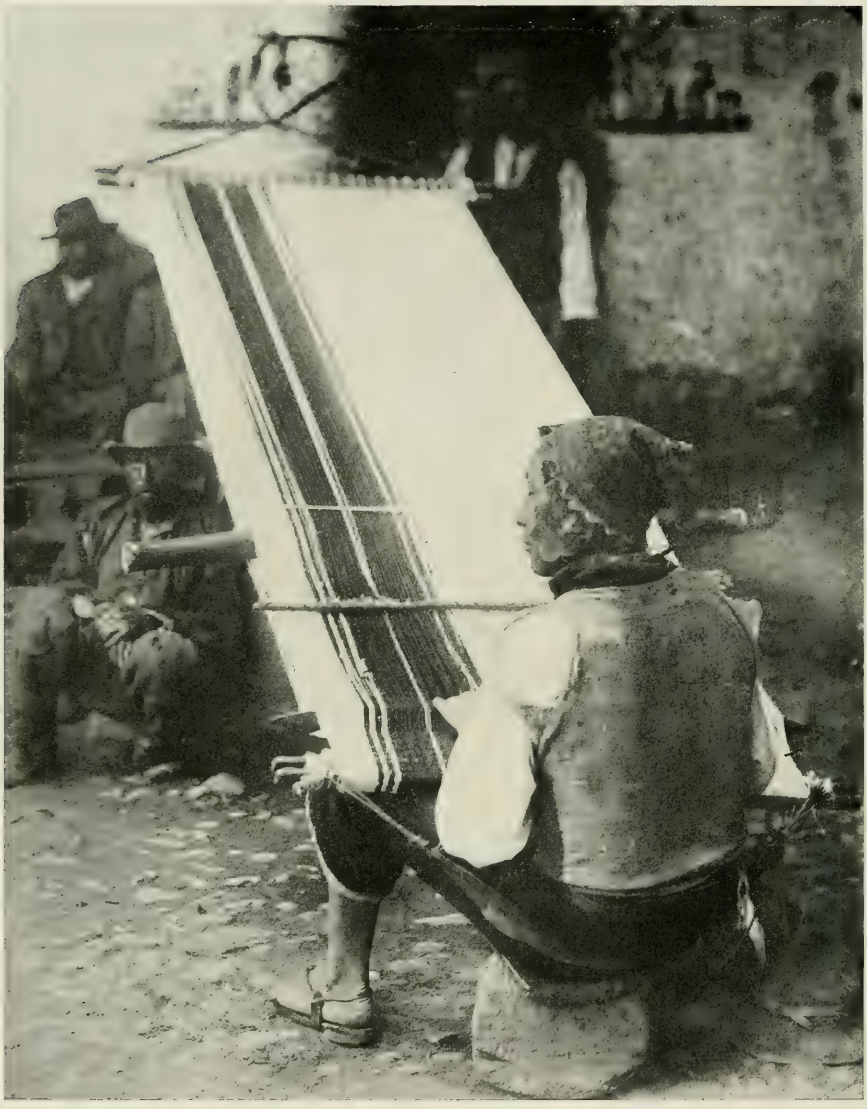
jars for holding *chicha* and water; workboxes containing materials and implements used in weaving; bags and mats; most beautiful of all, exquisitely woven garments and altar cloths.

The ancient Peruvians highly developed the art of weaving. They raised cotton and used the wool of the llama and other animals of its kind. Vicuña wool, being especially fine, was employed in the best materials. The designs in the weaving and on the pottery are in themselves descriptive of the people. The other day, in the American Museum of Natural History in New York, I saw an artist busily engaged in copying the unique design on a *poncho* worn, perhaps, by an Inca ruler. No modern work can excel many specimens left by the Peruvians.

The Andean Indians of today, both men and women, spin as they walk along the highway, using implements resembling those found in ancient graves. Many still weave their own garments, using crude looms. Their work, sad to relate, in no way shows the art of their progenitors, and they prefer the brilliant colors produced by aniline dyes to the soft shades popular long ago. The dreaded time is coming when they will forsake their picturesque homespun altogether for gaudy materials "made in Germany."

It is a simple matter for the visiting American to see why the Germans get the trade. In Cuzco, as in other out-of-the-way places in South America, they study the needs and tastes of the people. If the descendants of the Incas yearn to wear pea-green and royal purple, the Kaiser's commercial travelers plan that they may.

Few travelers visit the attractive old city—a German, Briton, or American now and then in the interest of trade, an occasional student. At the time of our visit there was only one other *gringo* in town, an American engineer, with the



A PONCHO WEAVER OF CUZCO

exception of the few foreign residents (German merchants and British missionaries). A traveling circus and a theatrical company, each composed of Spanish and Peruvian artists, were in the town. The day after our arrival we were greeted (in Spanish) by a gentleman whom we met in the hotel dining-room, with the startling question, "Do you belong to the circus or the theater?" As the ladies of Cuzco do not wear short skirts, kahki jackets, high boots, and sombreros, I told Mr. Adams it was "up to me."

We attended both the circus and the theater, but found neither one amusing. The best entertainment afforded us was by the natives themselves on the streets

and in their homes. Of course, I am referring to the Indians and *Cholos,* who form the greater part of the city's population. There are charming and cultured people in Cuzco, as in all other Latin American cities.

One day we met an alcalde, who had just arrived in town, having journeyed five days on foot from the Paucartambo Valley. He was sitting by a fountain in one of the plazas, surrounded by a group of admirers. Not he, however, but the huge staff he held, was the object of their interest. An alcalde is a petty official, and in the remote highland valleys these men are usually full-blooded *Quichuas,* the position often descending from father to son. The insigna of office is a staff, taller than the man himself, usually of wood, banded with silver or copper. This particular alcalde had a staff of solid silver surmounted by a great knob. On this was an engraved inscription, which, translated from the Spanish, read: "Presented to Sinchi Sarayacu by Señora Doña Isabella de Gomez, April 1st, 1793." Evidently the unkempt, bare-legged gentleman, busily engaged in chewing coca leaves while describing his journey, came of a distinguished family in the eyes of his audience.

All of the highland Indians, men, women, and children, masticate dried coca leaves, which are brought up from the lowlands. They mix the leaves with lime, which extracts the cocaine. Coca is to the *Quichua* both friend and enemy. It stupefies him, but relieves him from cold, hunger, and fatigue. We traveled for days in the saddle over the dreary highlands with an Indian guide jogging along on foot ahead of us. Save for the bag containing coca and the gourd holding lime, he was unequipped for the journey, yet he never seemed tired or hungry and, although scantily clad at a high elevation, did not mind cold or altitude.

No savage or semi-civilized Indians in the Americas interest me as do the *Quichuas.* Theirs has been such a heart-rending history. Today they are hopeless after years of oppression, deadened by coca, woefully unclean in person; but of vicious traits they seem to have none. They are gentle in manner, fond of one another, patient and uncomplaining, speaking a language both beautiful and expressive. In the valleys beyond Cuzco we were alone with them for weeks, far from any Spanish-speaking people, and felt that we were perfectly safe. In the country places they impressed us as very sad. The *yaravis,* which they sang or played on their reed pipes at evening time, had a tragic note.

The republic's progress during the past ten years has been remarkable, and there is a great future for a country so splendidly endowed with agricultural and mineral wealth. In Cuzco, however, I seemed always to be looking backward. The evening before we left the city I climbed once again to the summit of Sacsahuaman and stood by the cross, looking down on the valley. It was half in shadow, but the city's many towers were ruddy with the glow of the setting sun; yet in the picture of my conjuring the church towers disappeared.

One temple alone rose in worship of the departing Sun-god. In the great square of Huacapata hundreds of people knelt, as the Mohammedans kneel today, at the evening hour with their faces turned toward Mecca. Here the worshipers faced the glowing west. The Inca himself, standing in the doorway of the temple, surrounded by his nobles, bowed his *llautu* crowned head. Ynti, the Sun, was departing, leaving his children in darkness, but Quilla, his spouse—the silvery Moon—would guard them till the morning. Night was falling on a contented and a prosperous people.

What blessing has European civilization brought to them which they did not already enjoy? What have they not suffered in the name of the cross which surmounts the hill? ?

Photo and Copyright by Underwood & Underwood, New York

CORK OAKS PARTIALLY STRIPPED OF THE VALUABLE BARK: ALMORAIMA, SPAIN

Photo and Copyright by Underwood & Underwood, New York

BOILING THE GREEN BARK—LIFTING A BATCH FROM THE VAT: THE CORK INDUSTRY AT ALMORAIMA, SPAIN

Photo and Copyright by Underwood & Underwood, New York

THE STOCK-YARD AT ALMORAIMA, SPAIN, WHERE PILES OF BARK AWAIT CURING AND BALING

CORK

CORK is the outer layer of bark of an evergreen species of oak. The tree is cultivated principally in Portugal and Spain. When the tree is about 15 or 17 years old the first stripping takes place, but this first crop is too coarse in texture to be of use except in tanneries or for rough purposes. The second stripping, obtained 8 or 10 years later, is also too coarse for finer uses than for floats for nets. With each stripping the quality improves and is continued at intervals of 8 years until the tree is 150 years old.

During the last several years the French have begun to exploit the natural cork of Algeria, where they have found about 1,000,000 acres occupied by the cork oak. The largest forests are in northeastern Algeria and contain some trees with a circumference of more than 30 feet. Messrs Thomas H. Kearney and Thomas H. Means, of the U. S. Department of Agriculture, give the following description of the cork oak industry:

Only natural forests are exploited in Algeria, no attempt ever having been made to establish artificial plantations (as in Spain and Portugal).

In bringing a forest of cork oak into condition for exploitation the first step is to remove the layer of old or "male" cork which forms under natural conditions. This operation, which requires considerable skill, is performed in the spring when the sap is beginning to rise. The subsequent yield depends largely upon the way in which this work of "demasclage" is done. It is advisable to put back into place the layer thus removed, fastening it around the trunk by means of wire and leaving it there for about two years; otherwise the trees are very liable to injury from dry, hot winds and from fire. Wrapping the trees in this way also prevents a second development of the worthless male cork.

The new cork which now begins to form is alone of commercial value. It is deposited at the rate of from 0.04 to 0.12 inch annually, and the first harvest is taken when the layer of cork has reached a thickness of about 1 inch. Thereafter the cork is removed every eight or ten years, the later crops yielding a better product than the earlier ones. The expense of each harvest from a single tree is about 2 cents.

Individual trees differ greatly in the rate at which cork is formed. As a rule, the best product is that which develops most slowly. Rapidly growing cork is more abundantly veined with loose tissue, which diminishes its value. The cork is sometimes seriously injured on the tree by the ravages of ants, which build galleries in it. The tree has also other insect enemies.

The cork, when cut, rolls up into tubes of the size of the trunk from which it was taken. It is first pressed out into sheets, then boiled, and finally the crust of bark is removed by scraping. Boiling increases the bulk by about one-fifth and renders the cork more elastic.

An acre of cork oak in full production yields a net annual revenue of about $2. The product from a single tree is worth from 4 to 10 cents a year after all expenses are deducted.

ACROSS WIDEST AFRICA*

An Account of the Country and Peoples Seen During a Journey Across Africa from Djibuti to Cape Verde

By A. Henry Savage Landor

The following article has been abstracted by the Editor from a very noteworthy contribution to geography, "Across Widest Africa," by A. Henry Savage Landor, recently published by Charles Scribner's Sons. The journey described in this work was over 8,500 miles in length and occupied 364 days. "Pleasure," says Mr Landor, "was its sole object. No white person accompanied the author, who bore the entire cost of the expedition."

In this brief summary it is possible to give only a few of the many strange sights seen by Mr Landor during his remarkable trip through what is probably the most disease-ridden and inhospitable section of the Dark Continent. The illustrations are all from actual photographs taken by Mr Landor, and are republished here, together with the extracts from the book, through the courtesy of the author, by whom the entire work is copyrighted.

THE start was made from Djibuti, on the Gulf of Aden, January 6, 1906. The most attractive of all the people in French Somaliland are possibly the Somali. They are quite of a superior type to any I found on my journey across Africa from east to west, except the Senegalese, on the West Coast. Although not superior in intelligence, they are superior to the Senegalese in physical appearance. They are tall, thin, and well proportioned, with well-chiseled limbs and features, a good arched nose, with rather finely modeled nostrils, and the lips, although developed, are not so offensively full as with most of the negro tribes of the central zone of Africa.

Their skin is of a smooth, delicate texture, with no superabundance of oily excretion, as in most negroid races, and their active life gives them a wiry, supple appearance quite devoid of extra flesh. They are of a nervous temperament, extremely sober and moral—when not demoralized by European ways—dignified and faithful in a high degree to their leaders. There is no bravado about them, but they are somewhat cruel by nature. They can endure hardships silently and stand impassive in case of danger.

Of the great number of men I employed during my journey across Africa it was only a Somali—a French Somali—who remained faithful to the very end. notwithstanding the severe hardships and sufferings which he had to endure. (See illustration, page 695.)

The Greeks, who were very numerous all over Abyssinia, have a wonderful facility for learning languages quickly. They also thoroughly understand the ways of the natives, and they are patient to a degree where a European would lose

* Across Widest Africa: An Account of the Country and People of Eastern, Central, and Western Africa, as seen during a twelve-months' journey from Djibuti to Cape Verde. By A. Henry Savage Landor. With 160 illustrations from photographs and one large map showing route. 2 vols. Pages 396, 508. 7 by 9½ inches. Imported by Charles Scribner's Sons, New York.

ADEM, THE AUTHOR'S FAITHFUL SOMALI, WHO ACCOMPANIED HIM FROM DJIBUTI TO CAPE VERDE

his temper and use his fists or his feet freely. So that these Greeks and Armenians, although doing business in a small way, seem to manage to carry away all the trade of the country; also it must be said that the natives are less suspicious of these men than they are of European traders, in whom they never put absolute trust.

Adis-Ababa, Menelik's capital. cannot be called a city in the proper sense of the word. There are thousands of white tents about, but few permanent houses, and it really impresses one more as a big encampment than a town. On the spurs of the hills to the right as one approaches the place one sees the modest buildings of the British Legation; then a grander one where the Russian minister lives.

Everything in Adis-Ababa is referred to the Emperor. It is quite amazing what an amount of mental work Menelik must go through daily. While attending to most important political affairs, matters of the most trivial character are brought to him for assent. This is practically

what happens every minute of the day at the palace: Menelik, with his head bandaged in a white *shash*, as it is called, a sort of silk kerchief, and with a cheap French felt hat with a large brim far back upon his skull, is pondering with some foreign minister over some political problem of great importance to his country—let us say, the projected railway between the sea and Adis-Ababa. The Emperor is deeply absorbed in thought.

Enters a servant, who whispers in the Emperor's ear, regardless of the presence of the foreign representative of a great European country:

"Your Majesty, the carpenter wants some more nails to mend the veranda."

"Here are the keys. Give him twenty nails," says the Emperor. "If he needs more, come again to tell me."

The Emperor is again in deep thought. Intruder number two comes up and whispers that a mule has escaped from the palace.

The Emperor jumps down from his throne—a high packing-case covered with Oriental carpets—slips quickly into the shoes which he has discarded, and hastens to his telescope, scanning the country all around with it, in order to see whether the missing animal can be detected upon the hills near Adis-Ababa.

No signs being apparent of the Emperor's wish to resume the conversation about the railway—the escaped mule being much more important to him than all the railways in the world—the foreign minister vainly attempts to drive the Emperor again to his throne. Attention is called to the interrupted discussion. The Emperor on his side endeavors to induce the minister to come and look for the mule.

The subject of the railway is again tactfully approached, and the conversation, thinks the minister, is proceeding satisfactorily, when a fresh disturber rushes in to inform His Majesty that the machinery in the mint adjoining the palace has stopped; so down goes the Emperor to see what has gone wrong, and he cannot be removed from the workshop until the machinery is set going again. He then calls for pieces of lump silver and gold, and with his own hand amuses himself in striking fresh coins, which he then places in his pocket.

Menelik, as a man, is certainly one of the most charming, thoughtful men I have ever met, a fact one appreciates a great deal when one remembers that his people—I am speaking of the Anharas, or pure Abyssinians—are possibly as mean, ungrateful, and abject as it is possible for men to be. There is with them no real paternal, maternal, fraternal, marital, or any other kind of love, and all is suspicion and treachery among them.

Mr Landor gives the following entertaining account of a lunch with Menelik:

At last, when the Emperor had finished eating, the curtain was drawn. Before me was one of the most impressive sights I ever witnessed. The huge gates at the further end of the hall were thrown open and a flood of sunlight was projected upon a stream of white figures entering the building in a dignified and orderly manner, all going to their respective seats along low tables close together, occupying the entire hall. Each table was covered with five or six layers of flat breads, the top layer being sprinkled copiously with red sauce from large buckets which servants conveyed to and fro. Tobasco is mildly hot as compared with this red sauce.

At a top table near the platform on which was the throne were seated the older sub-chiefs and officers. At the further tables were the soldiers. At the four tables on the left sat the officers' servants and followers.

No one paid obeisance to the Emperor on entering, as all seemed to look upon this feast as a right. In fact, a similar feast was given by Menelik every Sunday to some or other of his people.

All the men entered and sat themselves down, proceeding at once to make a hearty meal. Hundreds of huge pieces of raw meat were passed round by attendants, and each guest cut a chunk with his knife and ate it, tearing at the raw

GUESTS ON THEIR WAY TO EMPEROR MENELIK'S LUNCH PARTY FOR 7,980 PEOPLE (SEE PAGE 698)

meat with his teeth. Tall enameled iron tumblers of *tetch* were given to the soldiers.

One of the typical sights of this banquet was a huge mountain of bread upon a central table, the mountain being 8 feet high, 14 feet long, and 4 feet wide—some 448 cubic feet of bread. This was besides counting the thick layers already laid upon the tables, which were fast being demolished as each relay of guests came in. Large as the hall was, it was not sufficient to hold the guests at one time, and they came in by installments, each set of guests being expected to consume one layer of bread.

As soon as one lot had been fed and departed, the crumbled top breads were hastily removed, the under layer quickly besprinkled with the red sauce, the carpets and rugs shaken so that the dust from the people's feet went to settle down upon the food that was to be eaten by the next lot.

And so the hours went by. Swarms of figures kept pouring in with their black faces and white cloaks, giving quite a Biblical appearance to the scene. They sat with their stolid faces round their chief, who in turn was the very representation of one of the ancient patriarchs one imagines from reading the Bible. To him these people paid their oxen and cows, their grain, milk, and butter, and, as he knew no better way to get rid of his wealth so he gave back to his people plenty to eat and to drink, to show the fatherly interest which he took in his subjects.

I studied Menelik carefully. He really seemed to delight in having his people around him, and in watching them feed heartily and enjoying themselves.

I asked the Emperor how many oxen and sheep had been killed that day, and he told me that over one hundred and twenty oxen had been dispatched and several hundred sheep.

Menelik certainly had the best-natured face, not the handsomest, of any Abyssinian I had seen. There was something leonine about his countenance, although his eyes, very prominent and bloodshot, had more the suavity of bovines. He was badly pock-marked. He possessed a capricious, turned-up nose, narrow at the nostrils, and prominent lips, the lower rather too drooping to suggest strong will. His Imperial Majesty's skin was as black as coal and rough; but although the face was altogether rugged, it was absolutely devoid of vulgarity. Intelligence and sharpness of wits showed clearly in his expression.

Many of the better Abyssinians have told me that their war with Italy has been a ruin not only to Italy, but to the Abyssinians themselves, who will some day surely pay for the conceit they have now acquired. Barring some of the people in power, it is difficult to make the public at large differentiate between nations of Europe. For them, bearing one white nation means beating the whole world of white people.

There are few regions in Africa which are richer than the western and southwestern portions of Abyssinia, generally known as the Galla country. Its picturesque mountain masses are well wooded and the valleys are regular gardens. The climate is ideal, water for irrigation plentiful, and the soil so fertile that it will produce anything with the minimum of labor.

In Abyssinia there is at the present day immense wealth in gold and silver money and in ivory lying idle.

Owing to the peculiar way of administering justice, in a country where no one speaks the truth and black-mailing is usual, where the accused, whether innocent or not, is not judged according to his crime, but is first of all imprisoned and his property confiscated, it is no wonder if those who possess wealth keep it carefully buried; also the fact that a wife on divorcing her husband can claim half his fortune tends to promote this attitude of suspicion toward all neighbors.

Enormous quantities of ivory, I am told, are buried in Abyssinia, and are gradually getting spoiled. Menelik has a vast amount of this valuable possession stored away. Possibly ivory, with its ever-increasing value, may be used some

day as a deposit security in banking concerns of Menelik's empire

It is also said that Menelik has considerable sums of money buried at Ankober, in the mountains northeast of Adis-Ababa, and also at Mongoresa.

Many of the men seen after leaving the capital wore caps made from the skin of the *guresa,* a beautiful big monkey, which possesses a silky coat, black under the arms, not unlike a small "zouave," while all round the lower portion of the body the hair is equally long, but of the purest white. The face is framed in a white beard, and the magnificent long tail has a big white ball-like tuft of hair at the end.

One of my Abyssinian soldiers—these Abyssinians have the instinct of destruction in a marked degree—shot one of these monkeys one day, for which I severely punished him. The poor monkey was wounded, and fell upon the trail from its high perch on the top of a tree. In intense pain, the poor animal seemed just like a human being in its dying moments, and the reproachful expression of its face haunted me for days.

I do not believe that I have ever seen more beautiful monkeys than these *guresa,* and I could never restrain my admiration for their marvelous powers of jumping from one tree to another, and for their intelligence in using the swing of the branches in order to be propelled amazing distances through the air by the impetus. The skin of the *guresa* has a considerable market value in Abyssinia.

Abyssinia is a great country for monkeys of all sizes, but perhaps the *totos,* or dog-faced, long-nosed monkeys, are the most common. Irritable to a degree, ill-tempered and vicious, these brown bristly haired brutes grow up to a good size. Although, like all monkeys, they can be amusing, they were always quite repulsive to me, as they were neither beautiful nor graceful.

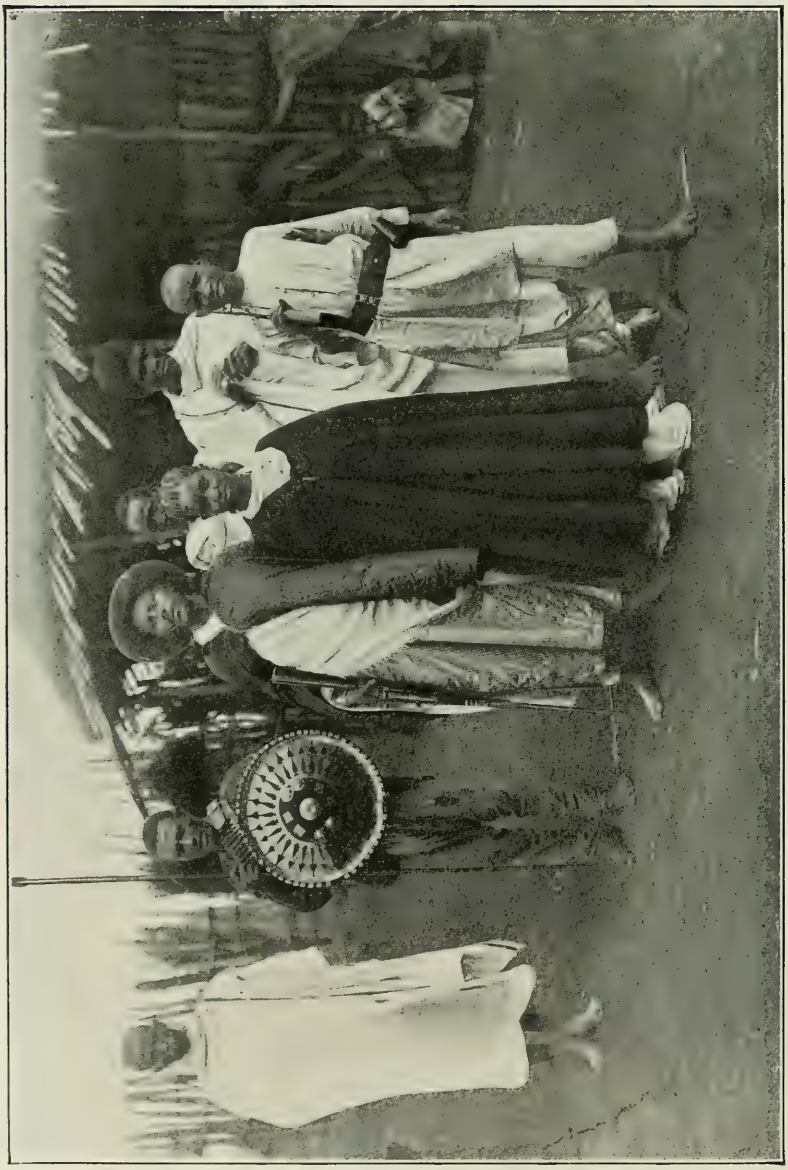
GALLA WOMAN SELLING BUTTER: ABYSSINIA

Of the priests, of whom there are probably 6,000 in Abyssinia, Mr. Landor has nothing kind to say. "Depravity was plainly depicted upon their features."

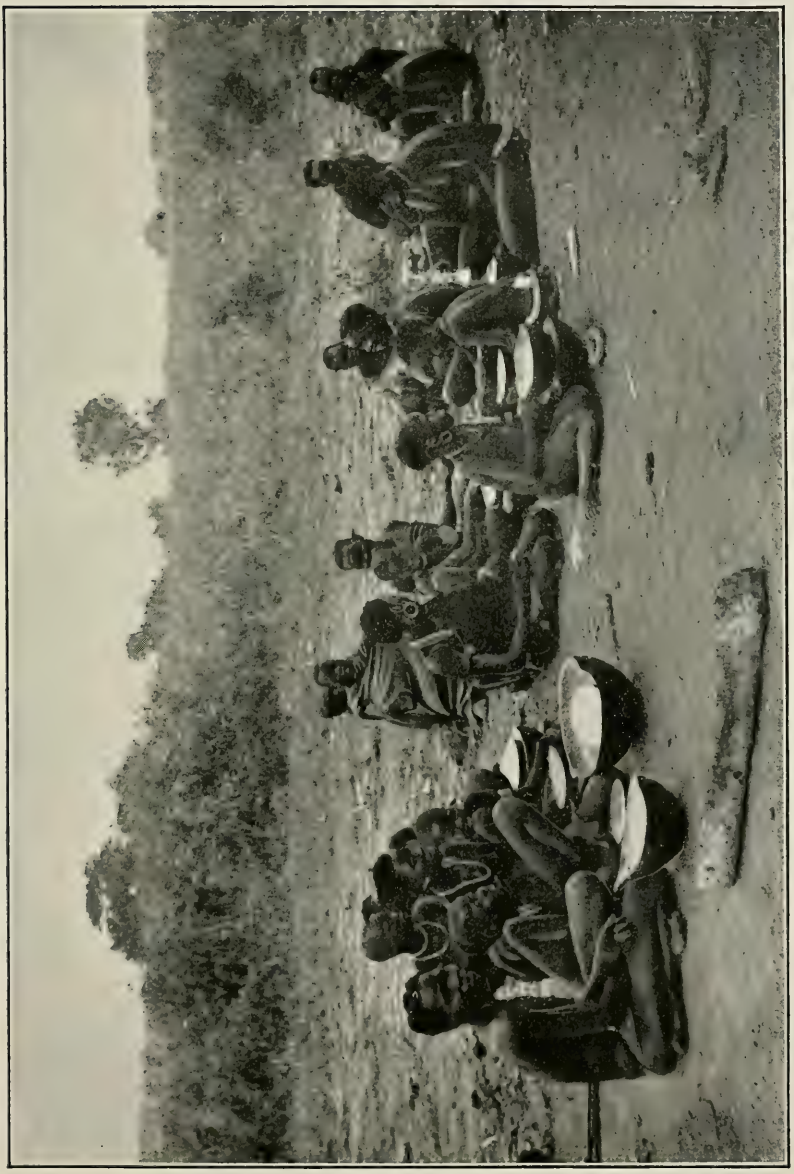
The author was nearly four weeks traversing the highlands of Abyssinia at elevations of from 8,000 to 5,000 feet. He found the country rich in game, elephants, giraffes, lions, leopards, ostriches, hyenas, and antelopes being plentiful, while innumerable flamingoes, cranes, and red gazelles were continually being seen.

He was astonished to find very few musical instruments in Abyssinia. Beyond the drum, a kind of violin, and the *kheras,* all of which they play very badly, there were no typical musical instruments of any importance.

From Abyssinia the author passed into



A TYPICAL HIGH OFFICIAL OF ABYSSINIA—GOVERNOR BIRU, OF BURE, AND HIS WIFE



WOMEN'S MARKET IN THE YAMBO COUNTRY

the country of the Yampos, the Nuers, and Dinkas, all of whom are long-limbed giants belonging to the British sphere of influence.

The Yambo women think they embellish themselves by making large cicatrices on the body, while the men indulge in similar incisions on the arms and chest.

As compared with the dances of Asia, I never saw among any of the tribes of Central Africa dances of any originality or grace. The Yambo, like all negroes, dance a great deal at their festivals, the men and women often joining in these dances; the men opposite the women, who sing and clap their hands, while the men jump and hop about lightly with knees slightly bent. The tam-tam is not beaten with the hand, but with two sticks, and as these people do nothing but play on the tam-tam all day and all night, they eventually become skillful at it.

The chiefs do not remove their front teeth, but all the others, both men and women, do. In their particular case they profess that it is done in order to facilitate speech, as their teeth grow quickly at a peculiar angle, which makes it uncomfortable for them to close the mouth absolutely until the teeth are removed. Although this is the reason they themselves give, I think that their speech is only affected because their respiratory organs do not work as they should when the hot, fetid air of their region is inhaled in large quantities through the mouth—a fact which might certainly affect their speech also.

It is a curious fact that the Yambo who inhabit a region unmistakably deadly for all other people, as well as for tame animals brought there, are not themselves affected by malarial fever, notwithstanding that they are simply devoured by mosquitoes.

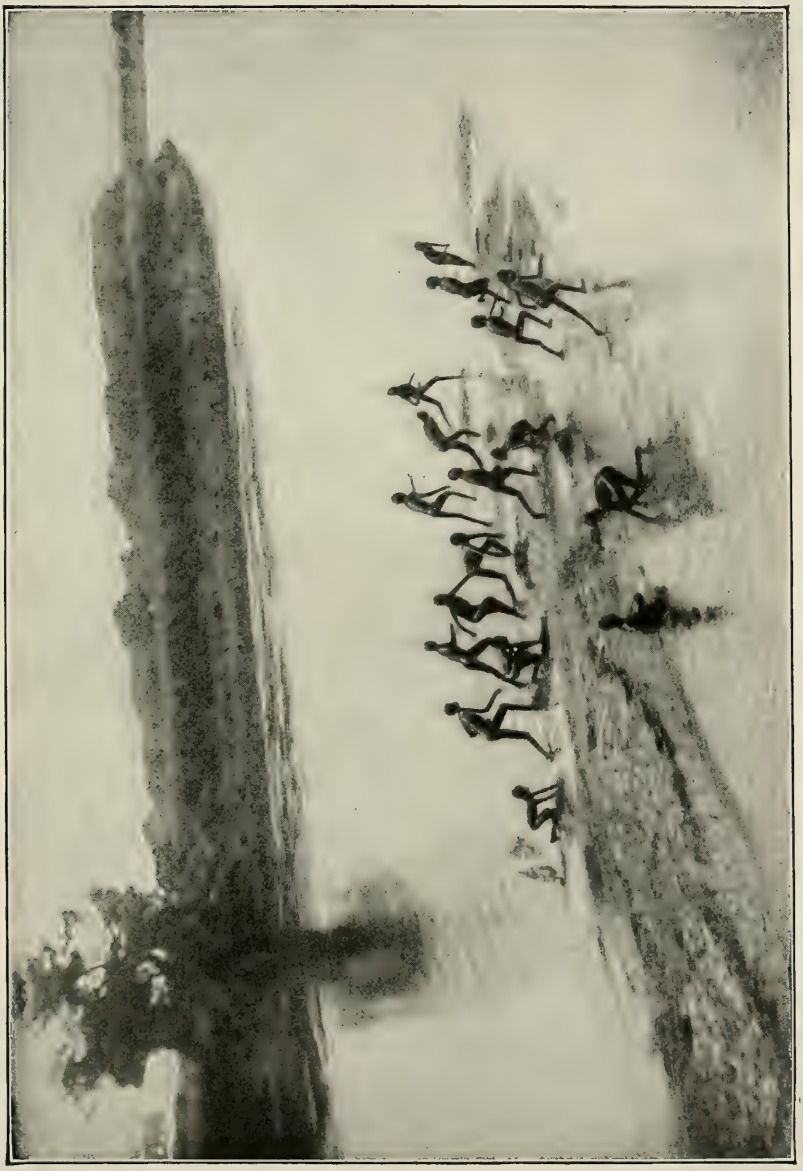
The narrative of the march through the Nuer country and descriptions of this long-legged people, with their queer methods of plastering the hair with red mud and their unique custom of keeping count of their love affairs by scars on the body make novel reading.

We marched over a wide, treeless, flat country, so trampled upon by elephants in the wet season that thousands of deep holes — their footmarks — covered the whole country and were a great nuisance —in fact, quite a danger—for my animals. These holes delayed us considerably, as they were often covered with grass ,and my animals were constantly tumbling into them.

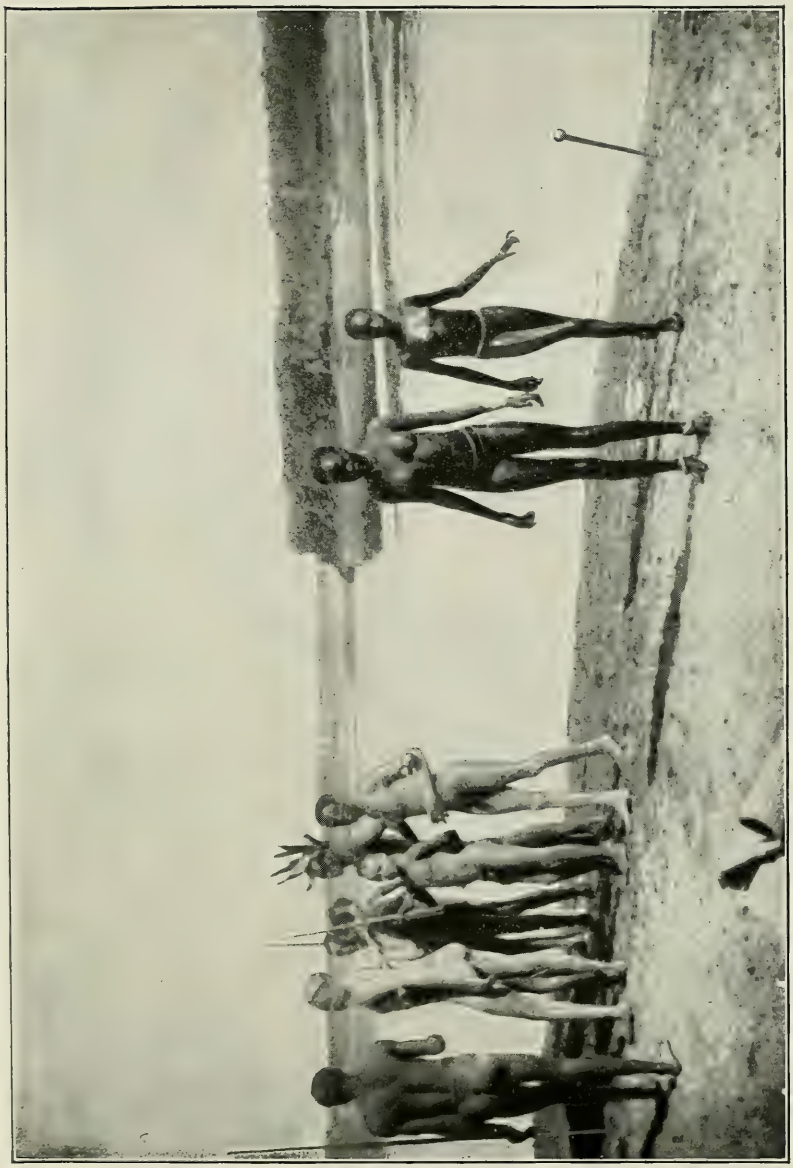
We had no experiences worthy of notice that day, nor did we see much game, except two herds of large red antelopes and flocks of herons striding majestically about, with their red beaks, black wings, white chest, and long red bag dangling from the neck. In the heat of the sun they spread their spacious wings and kept the head under the shade thus produced. They remained in that position sometimes for hours, generally perched on the top of high sand heaps or ant hills, thousands of which are to be found all over this country.

There was a slight difference in the type of these Nuer, and they did not generally follow the custom of smearing themselves all over with ashes like the tribes farther east. It was not uncommon, however, to see men painted white all over, except for a dash of grease upon the chest, which gave a beautiful black shine to the undyed skin, and a half moon by the side of it. The face and neck were painted of a brilliant red color, quite a ghastly practice. Another fashion common among these people was that of smearing the body with butter when it was not dyed with ashes. The skin became then beautifully polished. The reason all these tribes plastered their hair into a point was merely to remove the natural kinks and curls and render it quite straight; also, of course, to bleach it.

The vanity of these people was amazing. I saw two men with brass bracelets so tight round the forearm that the circulation had almost ceased and the hands had got swollen and almost atrophied. In two cases which came under my observation these bracelets had actually cut into the flesh at the wrist, and when I asked the owners why they did not remove them, as the hand was getting ab-



STAMPEDING NUER WOMEN (SHOWING GREAT LENGTH OF THEIR LEGS)



THE LONG-LEGGED PEOPLE—NUER MEN AND WOMEN

Most of the men of this people are over six feet tall

AUTHOR'S THREE PET OSTRICHES, AND LEPER CAMP-FOLLOWER

Leprosy and blood diseases in their most hideous form were seen in almost every community. In fact, lepers were so common that they mingled freely with the people, sometimes holding prominent positions as at Gori, where the chief of the market was a leper.

solutely paralyzed, they said they would rather lose the use of their hands altogether than remove such a becoming ornament. They said it had been there from their earliest days and they would stick to it.

We experienced steamy hot, quite oppressive, weather on our next march across flat, uninteresting country. We saw a lot of giraffes near the road, but I never fired at these animals for two reasons: First of all, because it was forbidden by the government; then because they were too tame and their skins useless.

There were beautiful birds flying about—small green parrots in quantities and tiny blue silky-coated humming-birds. Upon the ground crawled a great variety of beautiful lizards and chameleons of wonderful gradations of tints, from the richest and warmest cadmium yellow to the deepest ultramarine blue.

One beautifully shaped smooth-bodied lizard in stripes of yellow and dark brown was also noticeable, the yellow blending into a faint blue, which gradually got darker until it became deep and rich toward the end of the tail. The most common chameleons possessed bright yellowish heads, dark-blue bodies, and a yellow-ringed tail of light blue with a black tip. There was then another kind of rough-skinned chameleon in all shades of vivid browns and greens. Dozens of them played around me at the *"Gemaiza"* tree, where I had stopped for my lunch.

There were three wells here, thirty to thirty-five feet deep, with putrid water that stunk as we brought the bucket up to the surface.

More Dinka were to be found here, all with four cuts on each side of the forehead; men and women adorned with a pointed leather tail behind. Some wore quite a long tail, not unlike that of a modern dress-coat. Most of these tails were made of tanned leather, but many people wore tiny tails of antelope or waterbuck. Several women showed broad bands of small white and red beads with a fringe of rope just over the loins.

Young men displayed two rows of parallel dots upon their skin running down each side of the body directly under the breasts, and eventually forming an angle. All the men shaved the greater portion of the skull, leaving a circular tuft of hair at the back of the head, into which they stuck porcupine quills or ostrich feathers, as the fashion of day prompted them. The women shaved a good portion of the side hair and also part of the top of the head. They plaited what remained into tiny tresses, which they often smeared with butter and red earth.

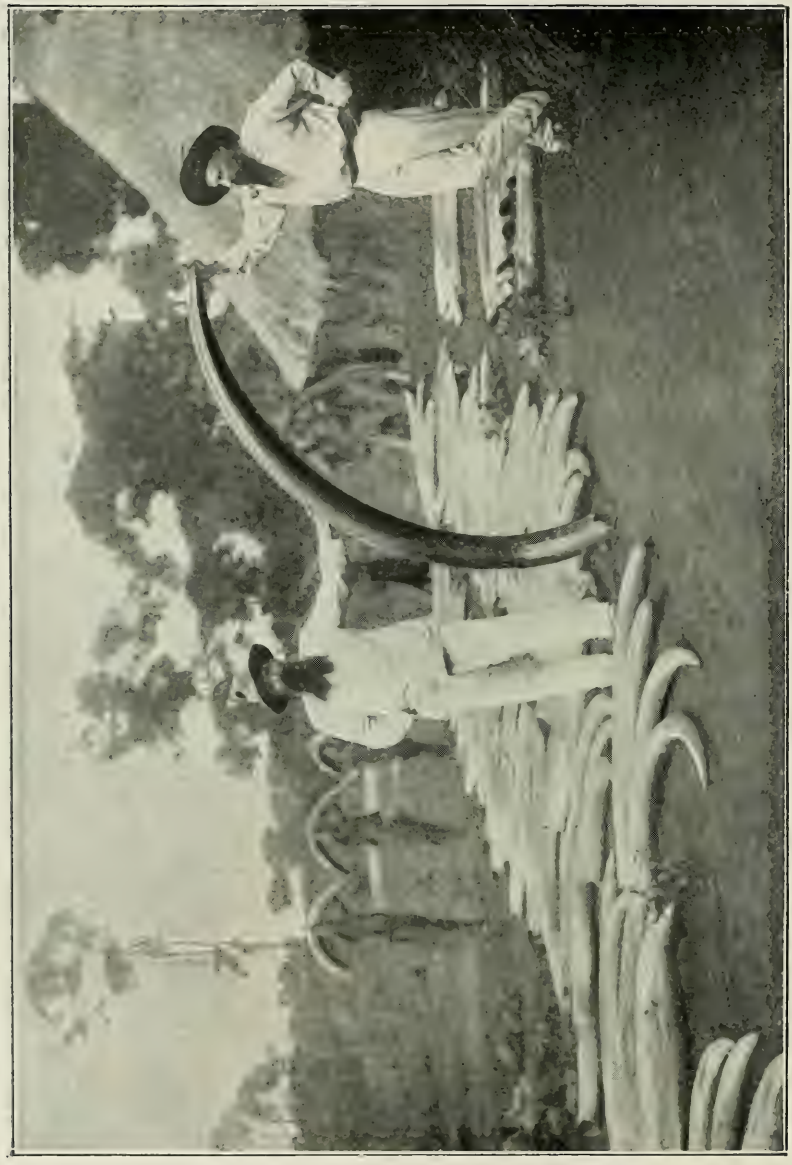
Although we still found a few men who covered themselves with ashes, the custom was not so general here as farther east.

Dinka houses had a narrow mud wall four feet high. A thatched roof, constructed separately, was placed bodily upon this wall when completed. A small open porch adjoined the front of the house and several small peepholes were to be seen around the wall of the hut.

The fashion of wearing many rings in separate holes all the way round the curve of the ears was common among these people. We fared badly for water, as there was none on the road except at these wells or in the small pools dug by natives or by the government. Some of these pools were only ten feet or so below the level of the ground in sandy soil. They contained a few inches of water, possibly as much as a small washbasinful.

After the hot marches, when we arrived anywhere insatiably thirsty, especially in the evening, we generally found natives sitting in these pools washing their limbs and body. As this was the only water we could find, it did not make us particularly amiable towards the local residents, and we had to face the problem whether we would resign ourselves to die of thirst or use it as best we could. I do not know that boiling improved it much. We generally disguised it into strong coffee, but there was so much lime in many of these wells that even the strongest coffee brewed was hardly less

SOMETIMES A SMALL FISH IS CAUGHT ON THE NILE; SOMETIMES NOT SO SMALL



IVORY ON THE RIVER CHINKO

YACOMA CREW IN AUTHOR'S CANOE ON THE RIVER MBOMU

TONGU WITH HAIR ORNAMENTATIONS OF BEADS, CONGO FREE STATE

THE SULTAN OF BONGASSO AND HIS WIVES

white than pure milk. It generally hurt one's gums and palate considerably as it burnt to no trifling extent.

Considerable time was spent at Bongasso, the headquarters of a French company with an immense concession, covering 145,000 square kilometers, the richest in Central Africa in rubber and ivory. The author was greatly impressed by the care the company was taking of its employees.

Strict orders had been given to all the *chefs des factoreries* to establish kitchen gardens in every *factorerie* and to grow all kinds of vegetables; every three months a box was dispatched from France with seeds of all kinds for every *factorerie*. This was deemed an important precaution to keep Europeans in good health, the need of good fresh vegetables being felt, especially in the great heat of the summer.

I have heard people talk a lot in England of French methods and how badly employees are provided for. This is one of those insular prejudices which, with many others, unfortunately prevail in this country regarding anything done by people of other nationalities. On the contrary, it was a pleasure to notice how thoughtful and generous, almost motherly, the *Société des Sultanats* was toward her staff. Constant and regular supplies were sent out at much expense to every agent of the company, each receiving a ration box containing a quantity of flour, plenty of wholesome red wine, a bottle of cognac, some champagne as a medicinal comfort, butter, biscuits, mustard, tea, and other articles highly welcome in Central Africa.

The development of the *Société des Sultanats* has been enormous during the last few years. In 1906 the production

RUBBER BEING BROUGHT IN AT SOCIÉTÉ DES SULTANATS (BONGASSO): FRENCH CONGO (SEE PAGE 711)

THE BEST DANCER ON THE UBANGI: BANZYVILLE, CONGO FREE STATE

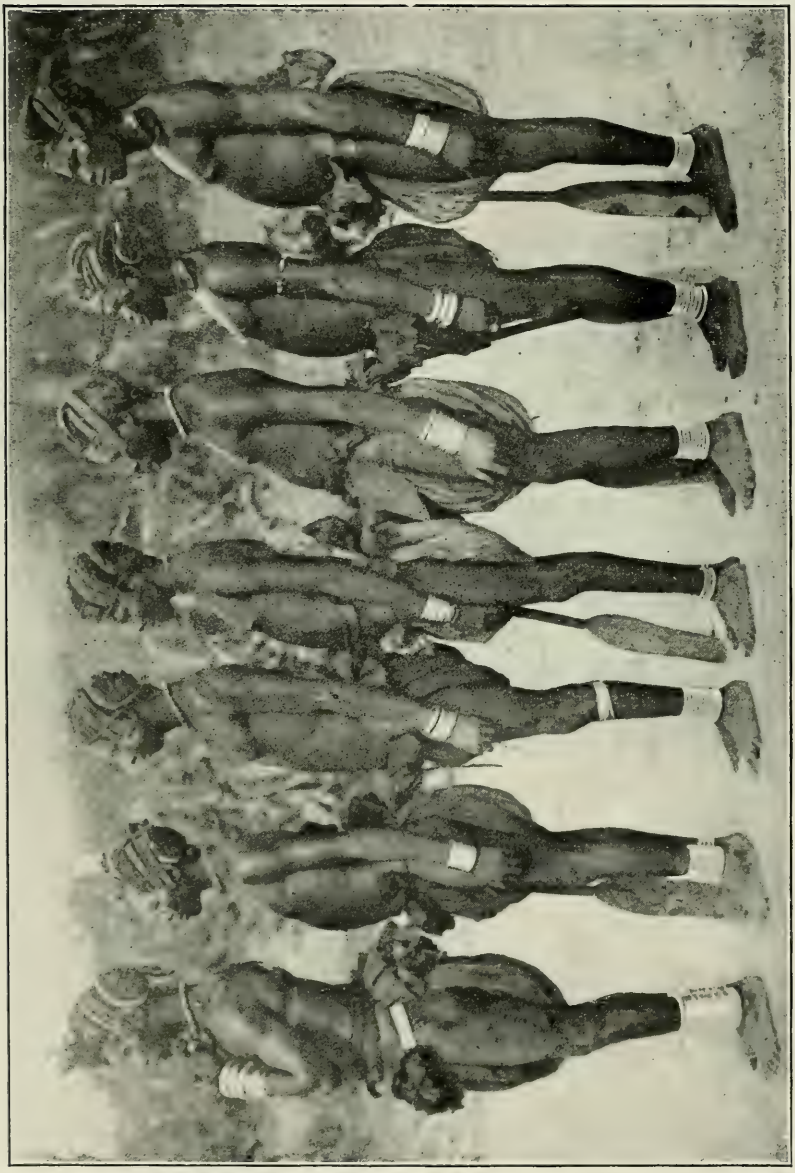
of rubber packed and sent over to Antwerp was over three hundred tons, and this year (1907) I am told on good authority that over four hundred tons are expected.

Particular stress is laid on the obligation imposed upon the concessionaries concerning the planting of rubber-producing plants, as well as the preservation of the forests. Under the *Societe des Sultanats* immense plantations of *ire* were being made, and from what I could see, and I saw a good deal, the country under their concession was being greatly benefited by the exploitation.

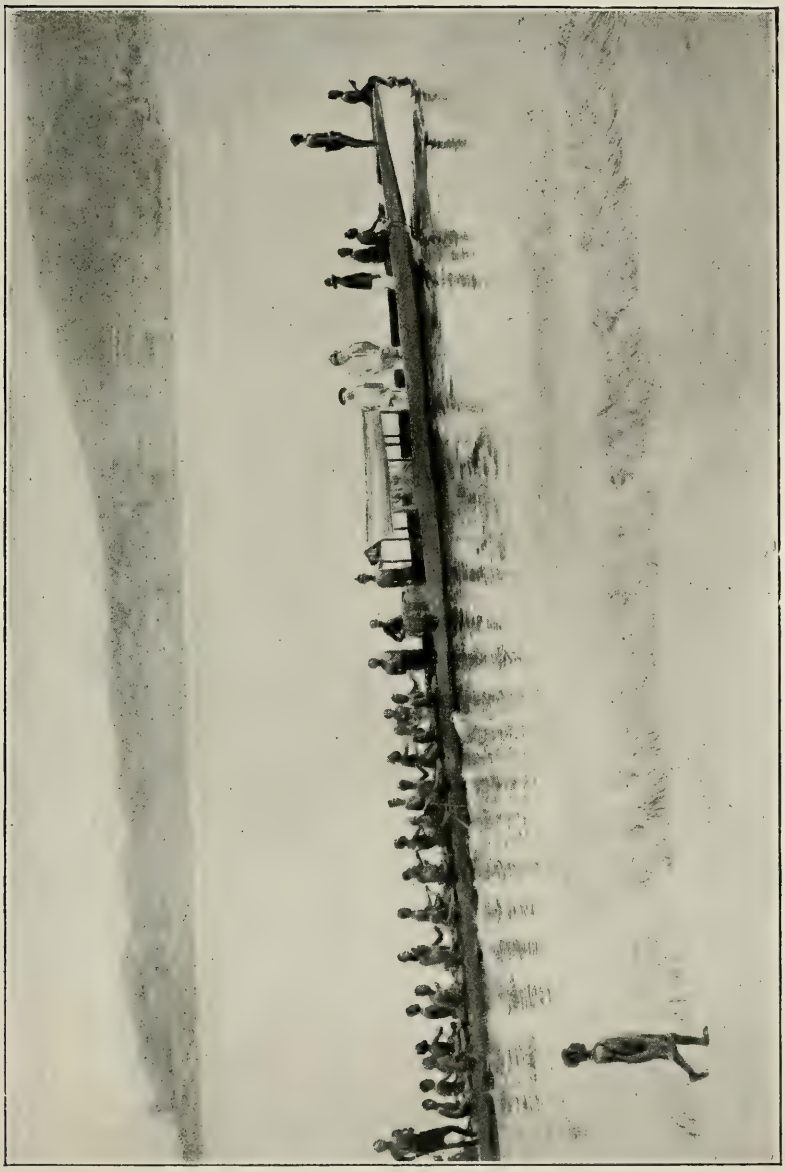
At the post of Yacoma, Congo Free State, great plantations were made of rice, wheat, Indian corn, and extensive plantations of rubber, the *Functunia elastica,* commonly called the *ire,* which was the most suitable rubber plant for that particular climate.

It was near Archambault (on the Shari River) that I found the custom of elongating the lips more exaggerated than in any other part of Africa, the women actually inserting small wooden or tin saucers in their upper lip and sometimes in both lips. The photographs which I took (see pages 723–726) will show better than a description how ghastly this fashion is. It was most ludicrous to hear these young ladies talk, especially when they had two plates, one in the upper and one in the lower lip, as these clapped like castanets, and the voice became nasal and unmusical.

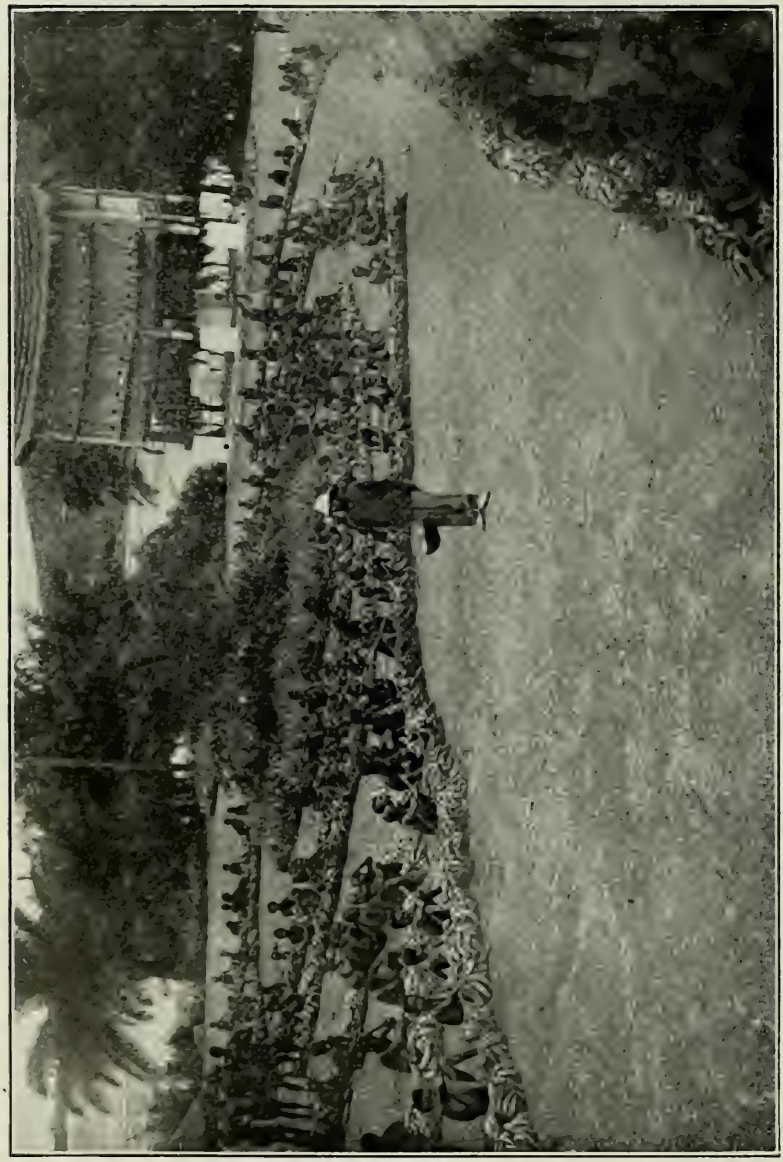
These women were otherwise well-formed anatomically and quite statuesque when young. They adorned their ankles and arms with brass rings and wore shell ornaments round the neck. The plates in the lips were occasionally removed, when the upper lip hung down so low in a loop



CANNIBALS WITH WONDERFUL BEAD DECORATIONS ON THE HAIR: CONGO FREE STATE



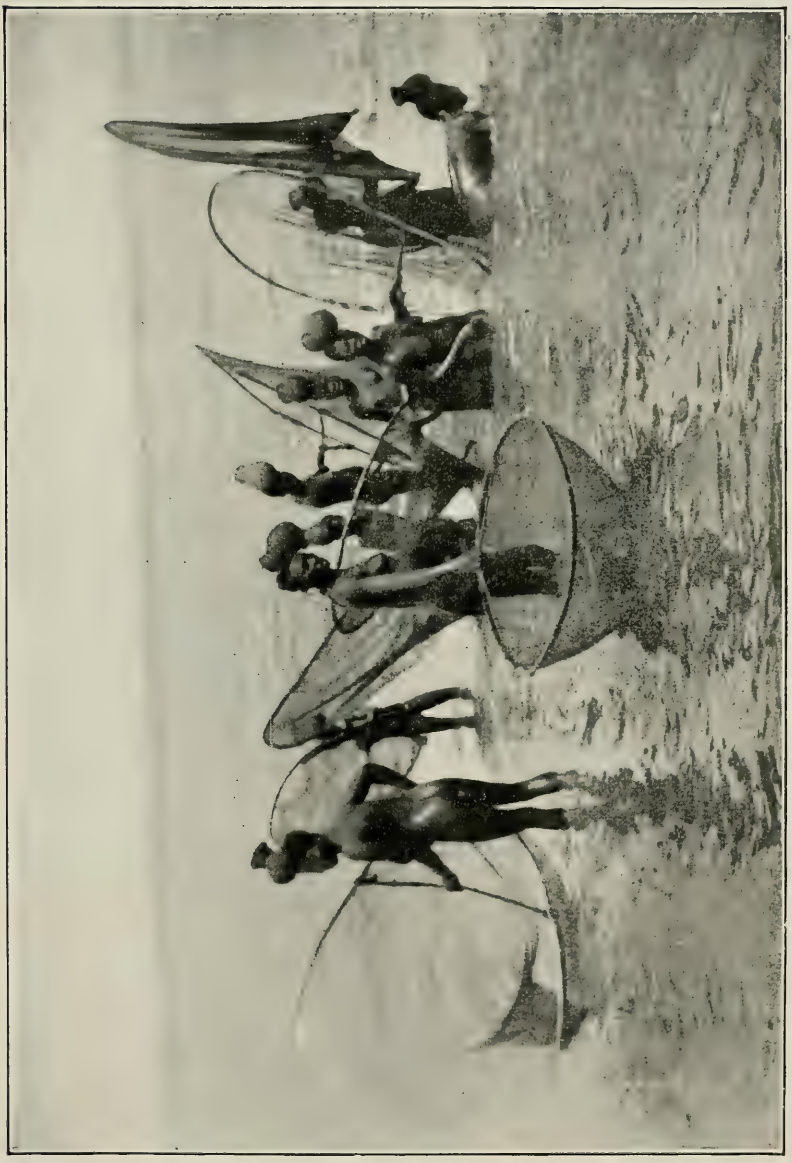
THE LONGEST CANOE (71½ FEET) ON THE UBANGI



BANANAS BEING CONVEYED BY NATIVE CHILDREN INTO THE CONGO FREE STATE POST OF BANZYVILLE

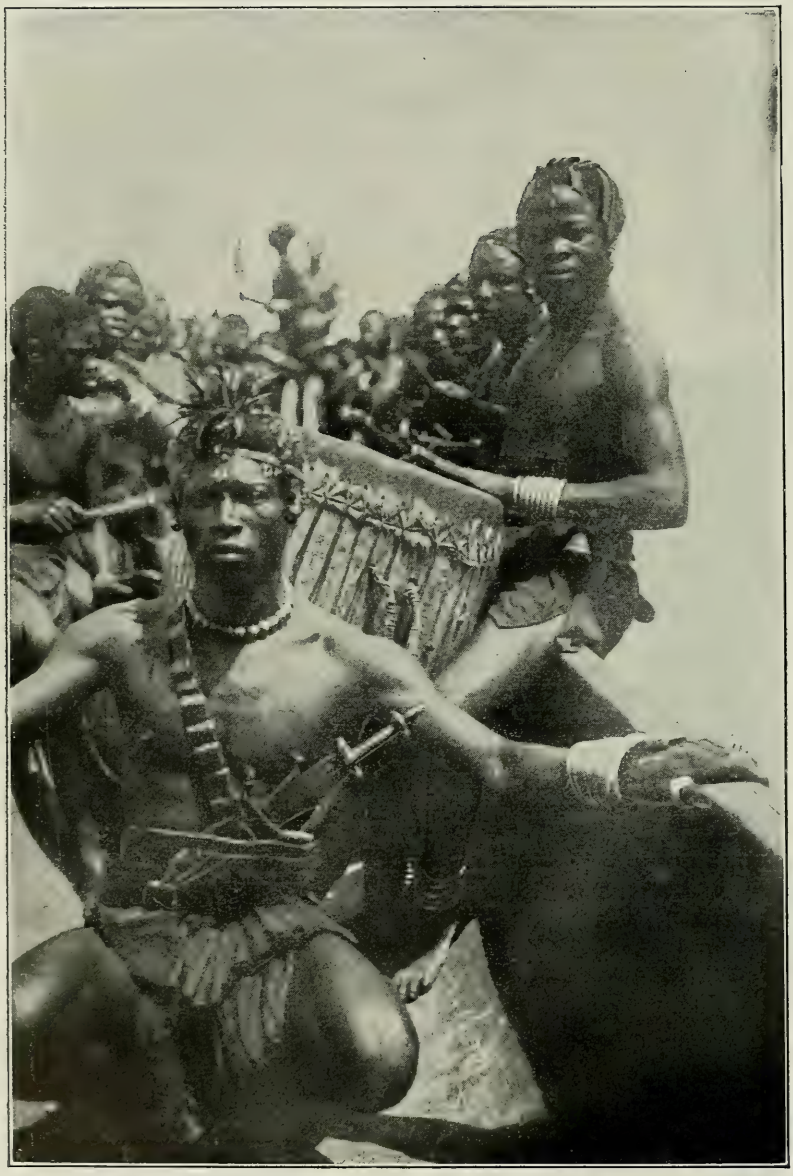
WOMEN DANCING IN THE CONGO FREE STATE

CANNIBAL DANCERS IN CONGO FREE STATE: THE DANCERS ARE CARRIED ON MEN'S OR WOMEN'S SHOULDERS WHEN NOT DANCING



FISHERWOMEN ON THE UBANGI, CONGO FREE STATE

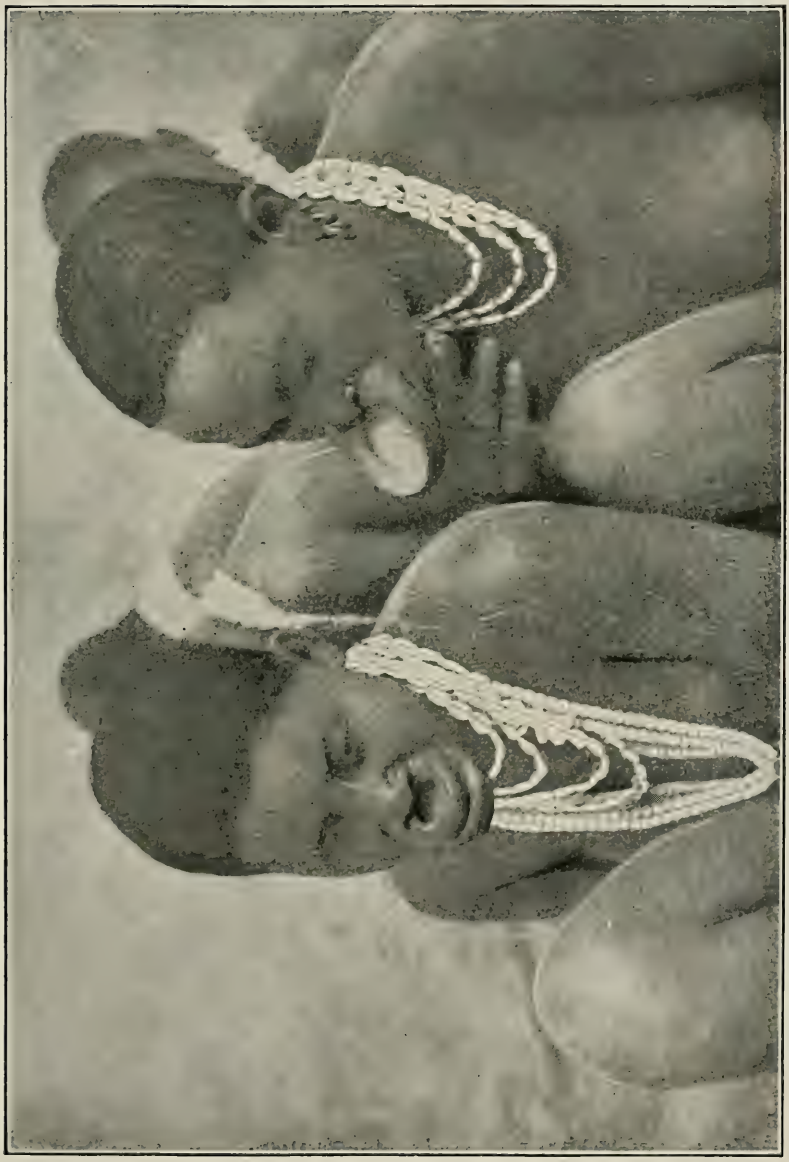
The small basket fastened to the head of each fisherwoman contains her catch



PICTURESQUE CANNIBALS: SANGO TRIBE

A BEAUTY COMPETITION

MANDJA WOMEN, SHOWING THEIR METHOD OF CARRYING THE BABY



WOMEN WITH ELONGATED LIPS: SHARI RIVER

WOMEN WITH ELONGATED LIPS (PROFILE)

as to reach lower than the chin, and left a repulsive aperture under the nose through which one could see the teeth. As the strain of the lip being pulled hurts them considerably, when they removed the disc or plate they generally licked the lip and the nose through this unnatural aperture.

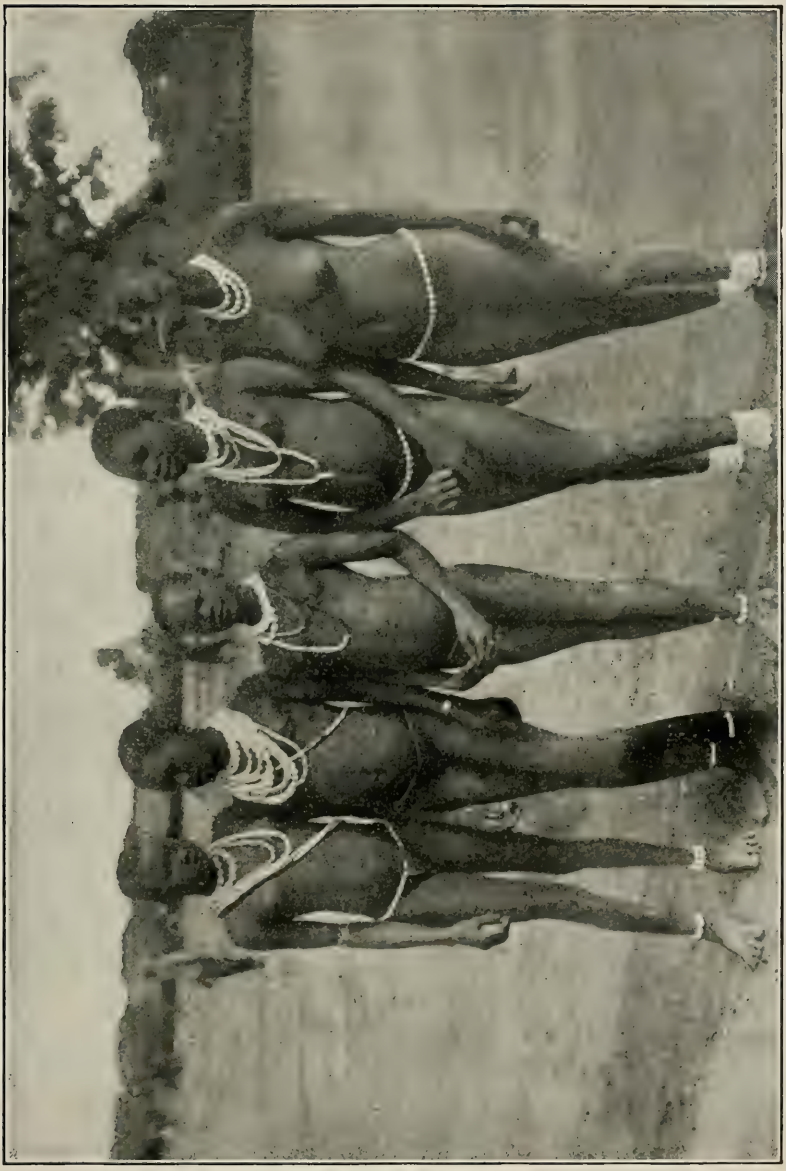
The Tuareg, found beyond Lake Tchad, had mostly intermarried with black tribes and were dark-skinned, but those further north, many of whom I saw, had white skins like the Arabs. They were undoubtedly the most attractive and noblest people of the desert in the French Sudan.

The Tuareg inhabit a quadrilateral country known by European geographers as the central plateau of the Sahara.

One of the most typical habits of the Tuareg is the wearing of a veil over the face, which has gained them the name of *Ahel-el-litham,* or "people of the veil," or the Arabic name of *Molathemin,* "the veiled." This veil is worn at all times by the Tuareg, and they never remove it either to eat or sleep, when at home or on a journey. Only the eyes are visible, the other parts of the face being hidden by the turban and by the *litham.* Nobody seems to know exactly the origin of this habit, or the reason why it has not only been kept up by the Tuareg, but has been copied by many other tribes in the Niger valley, and all over the desert.

Some people say that it is because the brigand-like Tuareg do not wish to be recognized by their enemies; others maintain that the Tuareg hide the nose and mouth to prevent the fine sand from entering their lungs; others, more scientific, say that it is in order to keep moisture at the entrance of the respiratory organs in a climate where the atmosphere is so extremely dry. Personally, I think that all these theories are inaccurate, and I believe it is nothing more or less than a fashion, as the women of the Tuareg, for instance, never wear a veil at all, and they seem in excellent health. Tuaregs never remove the veil from their faces even to meet friends or relations, and were it done among themselves it would be considered an insult.

There was absolutely no mystery about Timbuctu, and as soon as one entered the town the observer was forcibly struck by how much overrated this sacred place had been. From an artistic point of view there was not a single building in Tim-



WOMEN ON THE SHARI RIVER, SHOWING EXTENSION OF LIPS AT VARIOUS AGES

WOMAN OF THE LOWER SHARI: TWO WOODEN DISCS WERE INSERTED IN THE LIPS

TUAREGS WITH THEIR TYPICAL FACE SCREENS (SEE PAGE 724)

buctu worth a second look. Even the three mosques were of little interest as far as the architecture went, but were, of course, interesting from the historian's point of view.

In the southern part of the city stood the *Djingery-ber,* or Big Mosque, built in the eleventh century by an Alfa marabu called Alkali-Alakeb. This mosque has inside it a series of remarkable arcades and pillars supporting a heavy mud ceiling with a flat terrace above, the whole made of white stone and clay mixed with flour of the *Baobab fruit.*

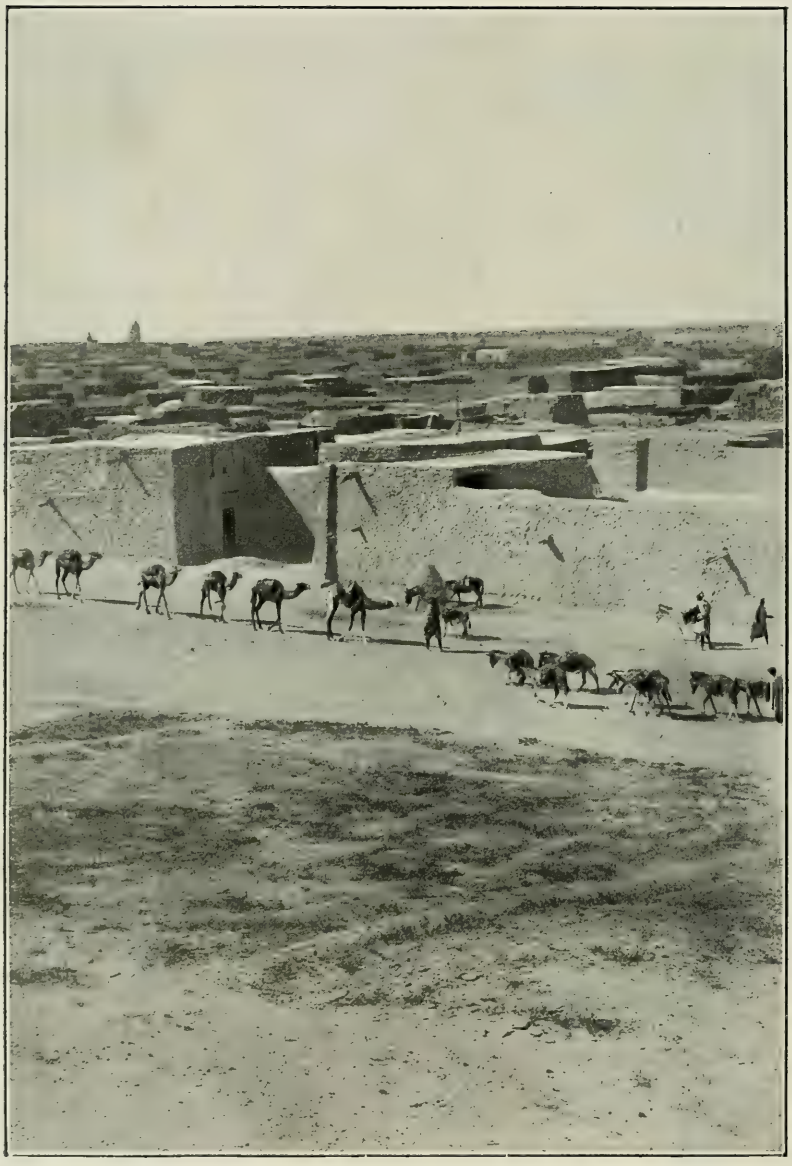
Not far from this mosque was the *yobu-ber,* or great market, by which I had entered the town, a vast rectangular square, the two sides of which showed arcades with square pillars. In these buildings merchants and peddlers had their stalls, whereas in the square itself dozens of women squatted on their haunches selling coal, wood, articles of food, cheap ornaments, etc.

Timbuctu was nothing more than a city of transit and exchange, with a fixed population of about five thousand and a floating population of some four thousand people. The floating population consisted of Arabs, Moors, and mer-

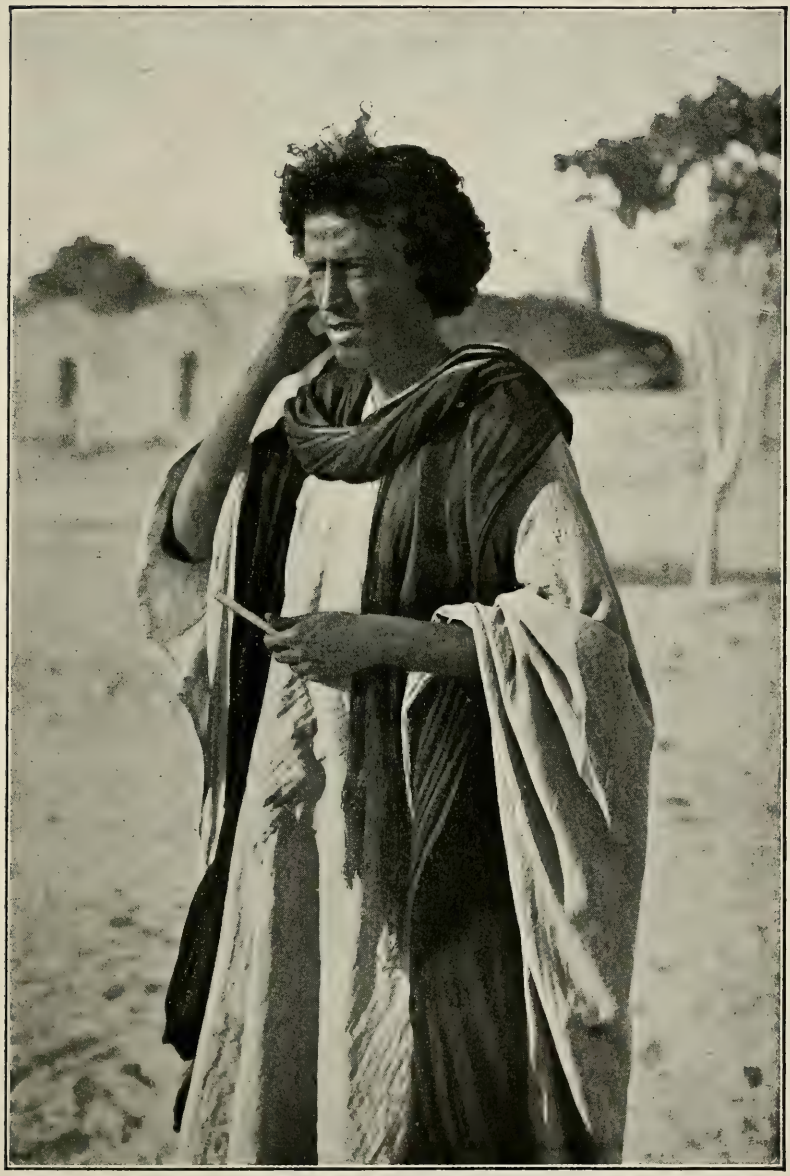
GREAT MUD BARNS FOR STORING GRAIN ON THE UPPER NIGER

These queer looking storehouses are really giant mud jars, with a small aperture at the top which is covered by mats or thatch and another hole on the side for ventilation. The latter is also used as an entrance. All the storehouses rest on supports about one foot from the ground.

HEADDRESS OF FULBEH WOMEN ON THE NIGER



CARAVAN ENTERING TIMBUCTU FROM THE NORTH



A MOOR OF TIMBUCTU

A WOMAN OF TIMBUCTU

chants from Tripoli, many from Ghadamenon, Tenduf, Tadjakant and Touat, who came every year.

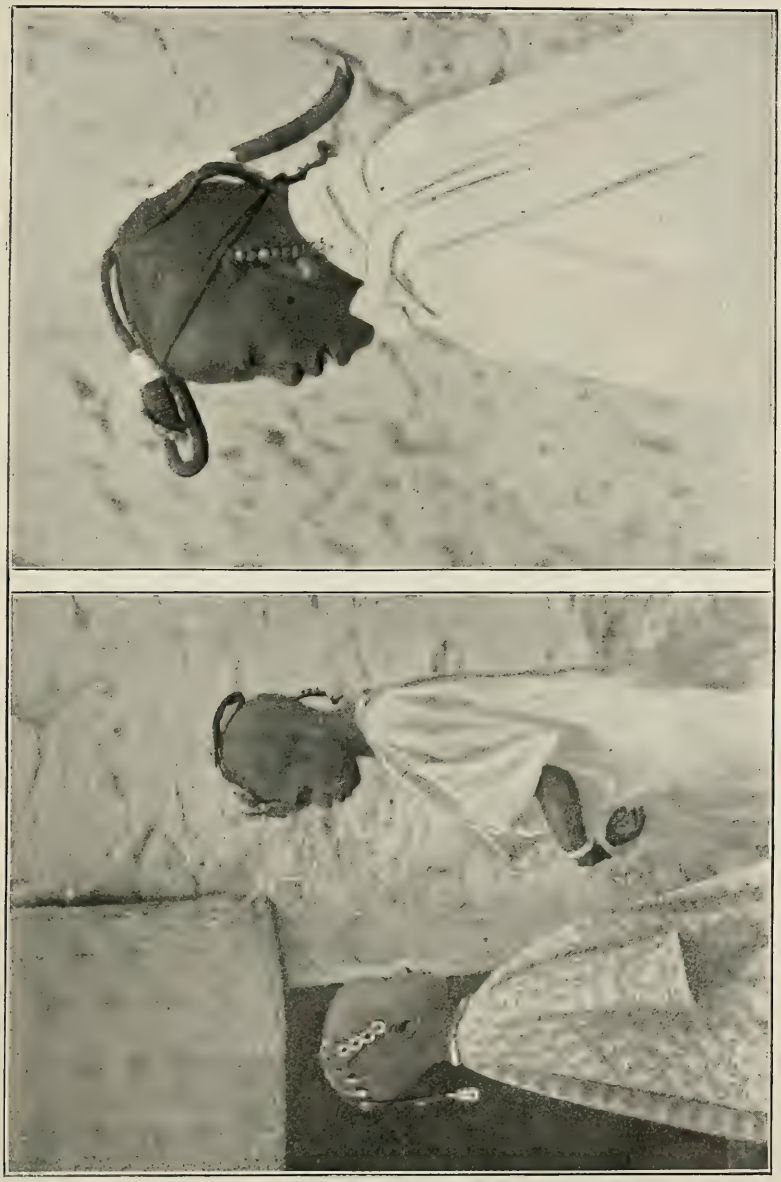
In Timbuctu we find ovens in the streets. They are constructed of mud, and are of a conical shape somewhat rounded at the top and lined inside with baked bottoms of broken earthen vases. In these ovens the natives bake their small round loaves, quite good, were it not for the quantity of sand which gets mixed with the flour of the inferior kind of wheat locally grown. The wheat is ground between two stones, the lower one larger than the upper.

These stones are imported at great expense from the mountains of Sahel in Morocco. After the flour has been coarsely ground it is passed through a thin material, and then rolled between the hands until it becomes fairly fine. Both in the big and the small market-places one sees dozens of women selling bread.

I do not think that I have ever visited a town where the varieties of headdress were so numerous and remarkable as in Timbuctu. When women were young, until the age of thirteen or fourteen, they fastened their hair into a plait which, with some additional black silk and with plenty of jewels and ornaments attached to it, stuck out behind and was called the *yellofoh* or "one tress only." From fourteen to fifteen they wore two or three queues, one behind and one in front, adding to them the fibre of the *kondji,* the plait behind being rolled up at the extremity and slightly lowered. This *coiffure,* which is called the *djnne-djnne* or "in front-in front," is also much decorated with beads and silver triangles.

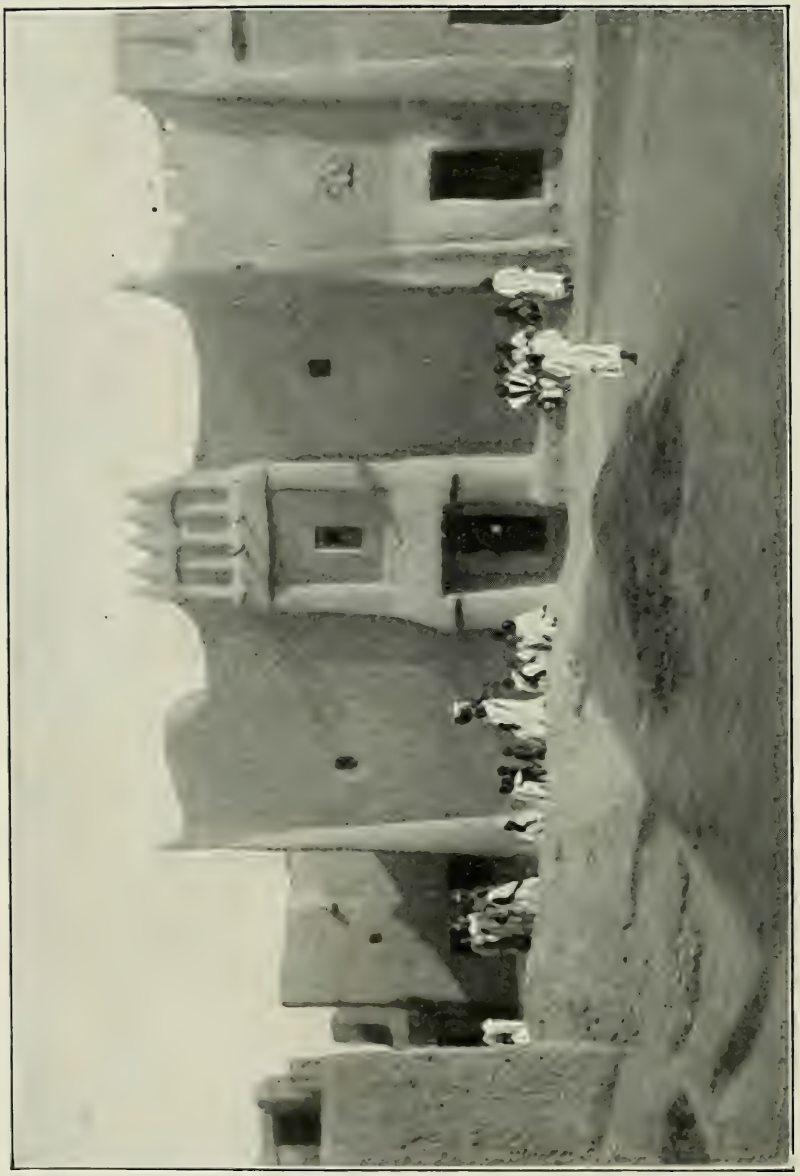
Unmarried women never showed balls of hair at the side of the head, but wore them on the top of the skull. Slaves, not married, had only one of these balls, a kind of pompom, on the right side. Most married women wore two of these pompoms, one over each ear. The two-ball arrangement for married women was a special *coiffure* fashionable in Djenne, the sister city of Timbuctu. When not in holiday dress, the girls also adorned themselves with these hair-balls, with an extra one behind the head.

Perhaps the most puzzling headdress to a male observer was the *Korbo-tchirey,* which, translated literally, mean "all sorts of rings, red," words which require explanation. They mean that the top plait, stiffened, described curves in all directions, ending in a sort of spiral at the back of the head. A triangular ornament of red imitation coral, or stone, was placed at the end of the bigger loop upon the top of the head. In other instances, two plaits were substituted for

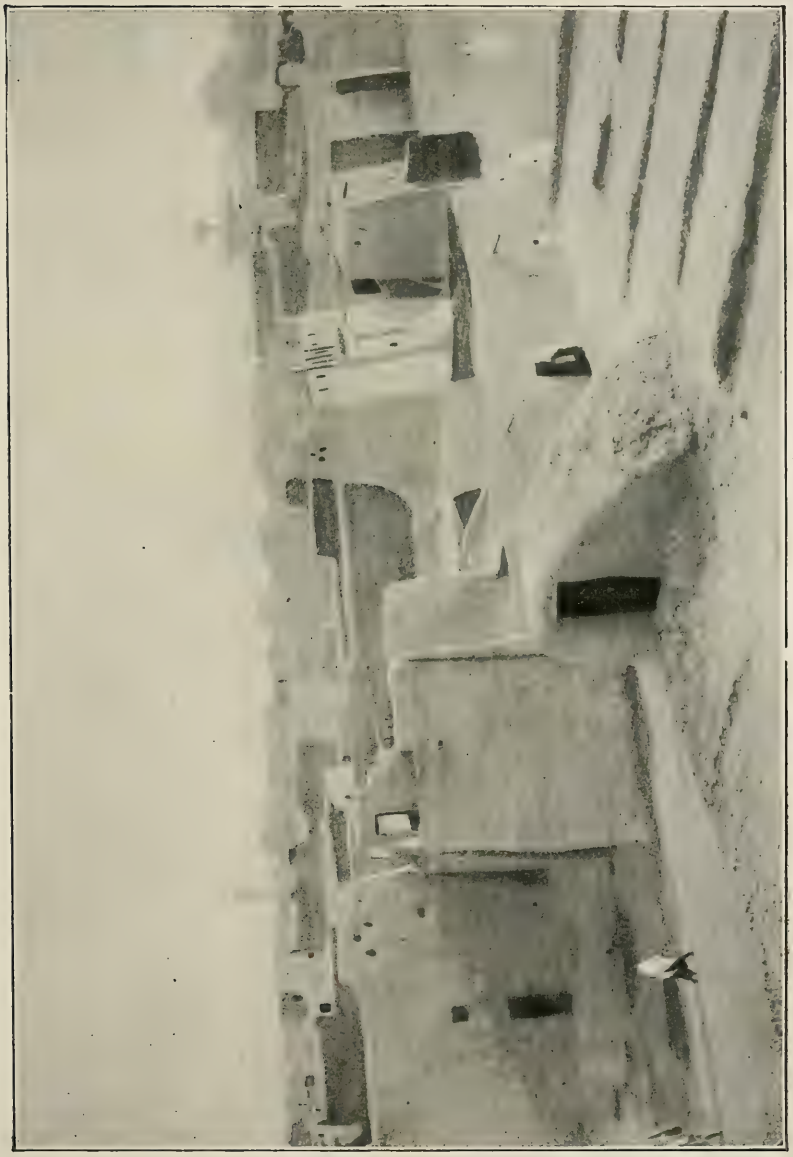


A GIRL

TIMBUCTU CHILDREN



A STREET IN DJENNE



DJENNE: TIMBUCTU'S SISTER CITY

the two side balls at the side of the face. A third circumscribed the forehead and turned over the right temple, where pendants were attached.

Quite unlike Timbuctu, which had a Moorish character, Djenne, her sister city, possessed marked characteristics, especially in her architecture, which reminded me forcibly of Egypt. Perhaps this architecture came with the Fulbeh. The high doorways with projecting columns right up to the top of the house, the small *musharabeah* windows between these two columns, the waterspouts from the roof, the two quadrangles at the summit of the house between square columns, and the small pyramids one above the other ornamenting the roof, were quite unlike anything I had so far met in this zone of Africa.

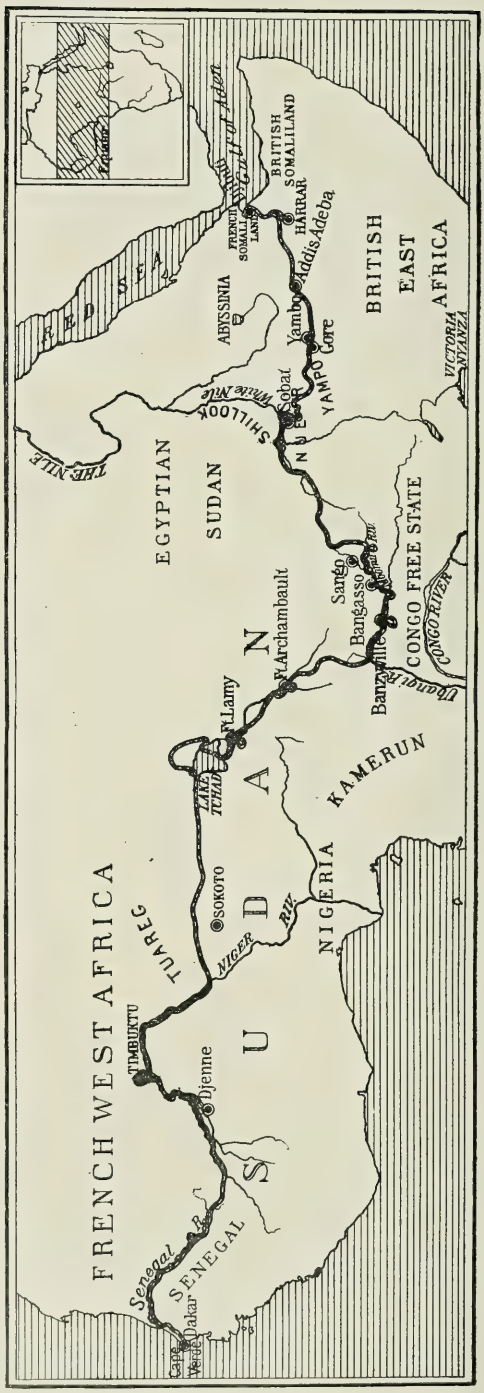
The streets were winding and beautifully clean. The whole place was entrancingly interesting and picturesque.

Djenne is situated in a delightful spot. Its pretty harbor for fishing boats and for canoes carrying merchandise; the charming little market-place where business is brisk; the dense population of well-to-do and well-dressed people—all contributed to making it attractive for me, who had been for a year among most inartistic natives and unpicturesque country.

The journey ended at Cape Verde. Here the French are building a great city, Dakar, which in a few years will probably be the finest city on the west coast of Africa. Long artificial piers projecting into the sea and elaborate docks have already been constructed, making a safe and deep anchorage. It will not be long before railways will connect the coast with the rich country beyond.

I climbed onto the very last rock of Cape Verde so that there should be no mistake about my having reached the most westerly point of Africa. Thus ended at this place, on January 5, 1907, the longest trans-African journey which has ever been taken from east to west.

At this point I drank in the company of the French gentleman who had accompanied me the only two bottles of cham-



pagne which I had carried the entire way across Africa. Except the cherries in rum with our friend with yellow fever in the train, this was the only stimulant I had taken during the last twelve months, and it was done to drink the success of the journey and not because I needed it.

The entire journey from Djibuti, where I had started on January 6, 1906, to this place had taken 364 days, the distance covered being no less than 8500 miles. I had arrived in flourishing health, and, although glad to return to Europe and to my friends I was indeed sorry that so delightful a journey had ended.

CONSERVATION LEAGUE OF AMERICA

By Henry Gannett

Geographer of the United States Census

OUR readers will recall the historic assemblage of the governors of the states at the White House, last May, to consider the subject of our waning natural resources and to take steps looking toward their conservation for future generations. It was a notable gathering. The governors of nearly all the states were present, and with them were leading statesmen, publicists, economists, engineers, and geologists. The assemblage was presided over by the President of the United States. The utmost unanimity prevailed, and a set of resolutions was agreed to declaring that every effort consistent with the necessary use of our resources should be made to preserve them for future use.

Shortly after this meeting the President appointed a National Conservation Commission, composed of four committees, one each on Waters, Lands, Forests, and Minerals, the chairman of the Commission being Mr. Gifford Pinchot, Chief Forester, who had taken the leading part in starting the movement. Many of the states also have appointed conservation commissions to coöperate with the National Commission.

This National Commission has commenced the task of taking an account of stock of the country's resources in water, land, forests, and minerals, in order, not only to know what we have, but how long, under the probable future rates of consumption, the supplies will last. With this are proceeding also studies of the best means whereby the drain may be lessened without injury to our industries, where waste may be stopped or reduced, and where products may be utilized more fully.

Some of the matters now under study are: Under the head of water, the amount of rainfall, the amount and character of the stream flow, the possibility of improvement of our streams for navigation, under comprehensive plans, the prevention of floods, the present and possible future development of water power, irrigation, etc.; under the head of lands, the status of the Federal land laws, the condition of our soils and their possible improvement to meet the increasing demands of the future, the additional amounts which can be put under cultivation, the condition of our public grazing lands and the steps which may best be taken for their improvement, the extent of our swamp lands and the result of draining them, etc.; under the head of forests, the amount of standing timber remaining to us and the rate at which it is being depleted, the best methods of restricting the cut, preventing destruction by fire and other enemies and of restocking the cut and burned areas, the relations of forests and streams, and many other allied matters; under the head of minerals, the supply in the ground of each ore and mineral and the rate at which these supplies are being exhausted, with studies of the best means of prolonging the supply.

The supply of game and fish and the rate of their destruction, with the methods

in use for their protection and restocking, and many other matters are under study which cannot be recapitulated here.

These studies are being made by scientists in the various bureaus of the Federal government, aided by officers of the state governments and state conservation committees. Prominent among the bureaus enlisted in the work are the Census, the Forest Service, the Bureau of Corporations, those of Statistics of the Departments of Agriculture and of Commerce and Labor, those of Plant Industry and of Soils, the office of Experiment Stations, General Land Office, Reclamation Service, and Weather Bureau.

The National Conservation Commission will meet early in December and receive a preliminary report on these matters, and later a second conference of the state governors will be held in Washington.

The work of the National Conservation Commission will consist mainly:

1st. In the collection and digestion of information concerning our resources. So far its work is commercial, or, better, economic geography.

2d. In the dissemination widely of this information, together with advice and suggestions as to the methods of conservation, and thus to cultivate public sentiment in the practice of economy in our resources.

3d. In so shaping legislation, both national and state, as most fully to carry out these ends of conservation.

In order to aid in this work an association of great organizations is being formed, known as the Conservation League of America, best described in the following letter of invitation to the National Geographic Society:

WILLIS L. MOORE, President National Geographic Society, Washington, D. C.

DEAR SIR: The recent conference of governors of the various states of the Union, together with many eminent men and representatives from a number of our great non-political organizations, which convened at the White House last May, has forcibly directed public attention to the decisive part which the intelligent development and wise conservation of our natural resources should and must play in the future of the nation.

As a result of the unanimous action there taken the President has appointed a National Conservation Commission to investigate and report upon the character, value, and extent of our existing natural resources, and this officially constituted Commission will undoubtedly accomplish a work of much permanent value.

The conference also served to emphasize, what has long been a growing conviction with many, that there should be some means of bringing into closer relation and more intelligent coöperation the unofficial associations which have a common interest in the broader aspects of the conservation movement.

It is apparent that such coöperation must be confined to those general aspects of the subject which are common to all of the existing organizations, and that the special and particular functions and activities of each association must not be interfered with, impaired or in any way affected. What is needed is simply that degree of general coöperation of all which will assist and make more effective the special work of each.

After conferring with the representatives of some of these associations, the National Rivers and Harbors Congress has undertaken to initiate such coöperation by inviting similar organizations to unite with it in forming the Conservation League of America, the sole purpose and function of which is embraced in a declaration of principles which is herewith enclosed. To carry on its work, a central headquarters is to be opened in Chicago, from which shall be conducted a campaign of publicity. . . .

The plan of organization and work has been submitted to President Roosevelt and to the Hon. William H. Taft and the Hon. William J. Bryan. It has not only been approved by them, but President Roosevelt has accepted the honorary presidency of the League and Mr. Taft and Mr. Bryan have consented to serve as honorary vice-presidents. Mr. Walter L. Fisher, of Chicago, has been chosen as president of the League, and representatives of organized labor and of organized capital will act as vice-presidents, spokesmen for both these interests having expressed hearty approval.

It will be seen that the new organization is, as it should be, absolutely non-partizan, both politically and industrially.

We cordially invite your organization to unite with the League. No financial obligation will be involved, as all funds necessary for the work to be undertaken have been kindly provided from voluntary contributors who are interested in it, and it involves no commitment of your association beyond the purposes declared. . . .

If you approve of the plan, kindly permit us to enroll your organization as a member of the League, and to use its name as such. Inasmuch as prompt action is essential to the suc-

cess of our movement, you are earnestly requested to reply at the earliest possible date.

Respectfully yours,

Jos. E. RANSDELL, *President.*

J. F. ELLISON, *Secretary.*

CONSERVATION LEAGUE OF AMERICA—STATEMENT OF PRINCIPLES.

Whereas, it is of the utmost importance that the natural resources of the nation shall be comprehensively and vigorously developed and utilized for the promotion of the public welfare without waste, destruction, or needless impairment, and subject always to their intelligent conservation and the effective preservation of the rights and interests of the future generations of our people.

Now, therefore, to secure the recognition and support of these principles by the people and by their representatives we hereby unite in a National Conservation League, and adopt for ourselves the following, taken directly from the declaration unanimously adopted by the conference of governors, convened by the President of the United States in the White House at Washington, May 13, 14, and 15, 1908.

We do hereby declare the conviction that the great prosperity of our country rests upon the abundant resources of the land chosen by our forefathers for their homes, and where they laid the foundation of this great nation.

We look upon these resources as a heritage to be made use of in establishing and promoting the comfort, prosperity, and happiness of the American people, but not to be wasted, deteriorated, or needlessly destroyed.

We agree that our country's future is involved in this: That the great natural resources supply the material basis upon which our civilization must continue to depend, and upon which the perpetuity of the nation itself rests.

We agree that this material basis is threatened with exhaustion.

We agree that the land should be so used that erosion and soil wash shall cease, and that there should be reclamation of arid and semi-arid regions by means of irrigation, and of swamp and overflowed regions by means of drainage; that the waters should be so conserved and used as to promote navigation, to enable the arid regions to be reclaimed by irrigation, and to develop power in the interests of the people; that the forests which regulate our rivers, support our industries, and promote the fertility and productiveness of the soil should be preserved and perpetuated; that the minerals found so abundantly beneath the surface should be so used as to prolong their utility; that the beauty, healthfulness, and habitability of our country should be preserved and increased; that sources of national wealth exist for the benefit of the people, and that monopoly thereof should not be tolerated.

We declare our firm conviction that this conservation of our natural resources is a subject of transcendent importance which should engage unremittingly the attention of the nation, the states, and the people in earnest cooperation.

We agree that this coöperation should find expression in suitable action by the Congress and by the legislatures of the several states.

Let us conserve the foundations of our prosperity.

This invitation has been accepted by the Board of Managers, provided that the organization shall be, as stated, "absolutely non-partisan, both politically and industrially."

The Magazine will keep our members fully advised of the work of the National Conservation Commission, and it is believed that our members will render all possible assistance to the ends and aims of the Commission.

A COMPARISON OF OUR UNPROTECTED WITH OUR PROTECTED FORESTS

NOTHING better emphasizes the necessity for the preservation of our natural resources than the great forest fires which have been so widely distributed throughout the country and have played such havoc this summer. It is doubtful if the losses for the year 1908 will ever be fully known, but a conservative estimate places the aggregate loss in all parts of the country at not less than $20,000,000.

In nearly every instance these devastating fires might have been prevented if the various states had provided an adequate number of men to patrol the woods and arrest all such fires in their incipiency, and if lumbermen and other users of the forest were careful to dispose of brush after logging, so as to prevent the spread of fires.

The Forest Service has had a lot of work to do on the national forests in the fire-fighting line this year, but the work has shown good results. Exclusive of the salaries of forest officers, the work of putting down fires on the national forests for the year has cost the government

$30,000. This means protecting approximately 168,000,000 acres. The value of the timber destroyed will not be known until the fire reports are made at the end of the year, though it is estimated that it will be larger than last year. But it will be insignificant when compared with the appalling fire losses outside of the national forests, on unprotected areas, or with the destruction which would have come to the timber in the national forests had they not been protected.

These results have come through the increased efficiency of fire patrol and methods of fighting fire and through the coöperation of settlers and users of forests who understand that the forests are their property and that a loss from fire is a personal one.

After timber is cut the regulations require brush to be compactly piled at a safe distance from living trees. Sometimes this brush is burned under direction of a forest officer; but even if it is allowed to stand, no fire that starts finds fuel by which it can spread.

In order to provide rapid means of travel between the various parts of the national forests and to facilitate the massing of large forces of men to fight fire, as well as to furnish vantage points from which the fires may be fought successfully, 160 miles of road and 3,300 miles of trail were built during the last fiscal year. In several cases fire-breaks from 16 to 100 feet in width have been constructed, from which all timber and inflammable material is removed, to furnish obstacles to the spread of fire, or straight lines of defense in fighting the fire once started. Several miles of such fire-breaks now exist on the national forests in southern California, where it is especially important that the forest cover on the watersheds of important irrigation streams be protected.

Just as rapidly as possible each national forest is supplied with shovels, axes, and other tools, which are distributed over the forests, and cabins and tool-boxes are placed at points where there is the greatest danger of fire and where they can be easily reached by trail. Field glasses are also furnished, since their use in discovering small fires at a considerable distance has proved very helpful.

Upon the basis of the Forest Service experience on the national forests, on which the total administration per acre, including fire patrol, amounts to only one cent, the whole forest area of the United States could be protected from fire at a total cost of less than $3,000,000. This would save an annual loss of $20,000,000 for timber alone, to say nothing of the enormous loss of life, the loss to new tree growth, the loss of soil fertility, the damage to river courses and adjacent farm country, and the depreciation in forest wealth and land values.

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EDITED BY

N. W. THOMAS, M. A.
Author of "Natives of Australia," "Kinship and Marriage in Australia," etc.

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THE NATIONAL GEOGRAPHIC MAGAZINE

THE RUINED CITIES OF ASIA MINOR

BY ERNEST L. HARRIS

AMERICAN CONSUL GENERAL TO SMYRNA

ASIA MINOR is the stage upon which have been enacted some of the most stupendous events in the history of mankind. Here the civilizations of the Orient and the Occident have ever met and struggled for supremacy. The Persian and Greek, Roman and Pontian, Byzantine and Moslem, Crusader and Saracen, Turk and Mogul, each in their turn came upon the scene, and were alternately overwhelmed by the vicissitudes of human life. Fragments of columns, arches, and temples now stand as silent sentinels over the tombs of their empires and cities.

Today these mangled ruins present a melancholy picture, yet they cannot be viewed without pleasure and regret. The pleasure consists chiefly in recalling the historical associations connected with each, while the regret is caused by the fact that nothing is done to prevent their further decay and demolition, and that in all probability future generations will lay considerable blame upon the present age for not having done more toward preserving these interesting and instructive ruins from an earlier destruction, at least, than would presumably be their destiny if left alone to the silent lapse of time.

The object of these papers is to deal with some buried cities of Asia Minor as they now are. A description of their present state of preservation cannot fail in interesting every student of history.

Asia Minor presents practically a boundless field for research and exploration. There are remnants of Hittite monuments still extant which date from the earliest dawn of history. Among the ruined Greek cities rise many a stately structure of Roman origin, now slowly sinking into decay. From distant hilltops medieval castles, some in a fair state of preservation, still look down upon the valleys below. The few travelers who visit the interior of Asia Minor today are greeted by these grim heritages of a great past. There they stand, as it were, the silent custodians of treasures and secrets which lie buried deep beneath, mutely appealing to the present age to bestir itself and rescue, before it is too late, these sinking tumuli, the receptacles of knowledge, which may enlighten and instruct present generations of mankind.

During the past year I have visited the sites of many ancient cities in Asia Minor. Many places described are rarely sought out by the tourist, and seldom

even by the archæologist. I may state that I have visited and inspected all the places herein described, and personally photographed the views here shown. I wish also to state in the beginning that I am not an archæologist, and have had no training on the subject. This must account for any inadvertencies which may crop up in the course of this narrative.

Much is being done at present in the way of excavating the ancient cities of Ephesus, Pergamus, Priene, and Miletus. For a number of years the Austrian government has been busy at Ephesus, and the German government is at present carrying on excavations at Pergamus and Miletus. On the whole, however, little has thus far been done to unearth the buried cities of Asia Minor. Superficial excavations have been made at many points. Thorough excavations, however, such as have characterized the work of the Germans at Priene, where a whole city has been brought to light, are an exception.

A CITY BURIED UNDER OLIVE ORCHARDS

The ruins of ancient Tralles are situated upon a high plateau which overlooks the fertile plain of the Mæander River. At the foot of the hills stands the modern town of Aidin, the second place of importance in the vilayet of Smyrna. Today this neighborhood is considered the garden spot of Asia Minor. It is the center of the fig district, and the olives and wine produced are much prized on account of their quality. This is also the region in which the best cotton in Asia Minor is grown.

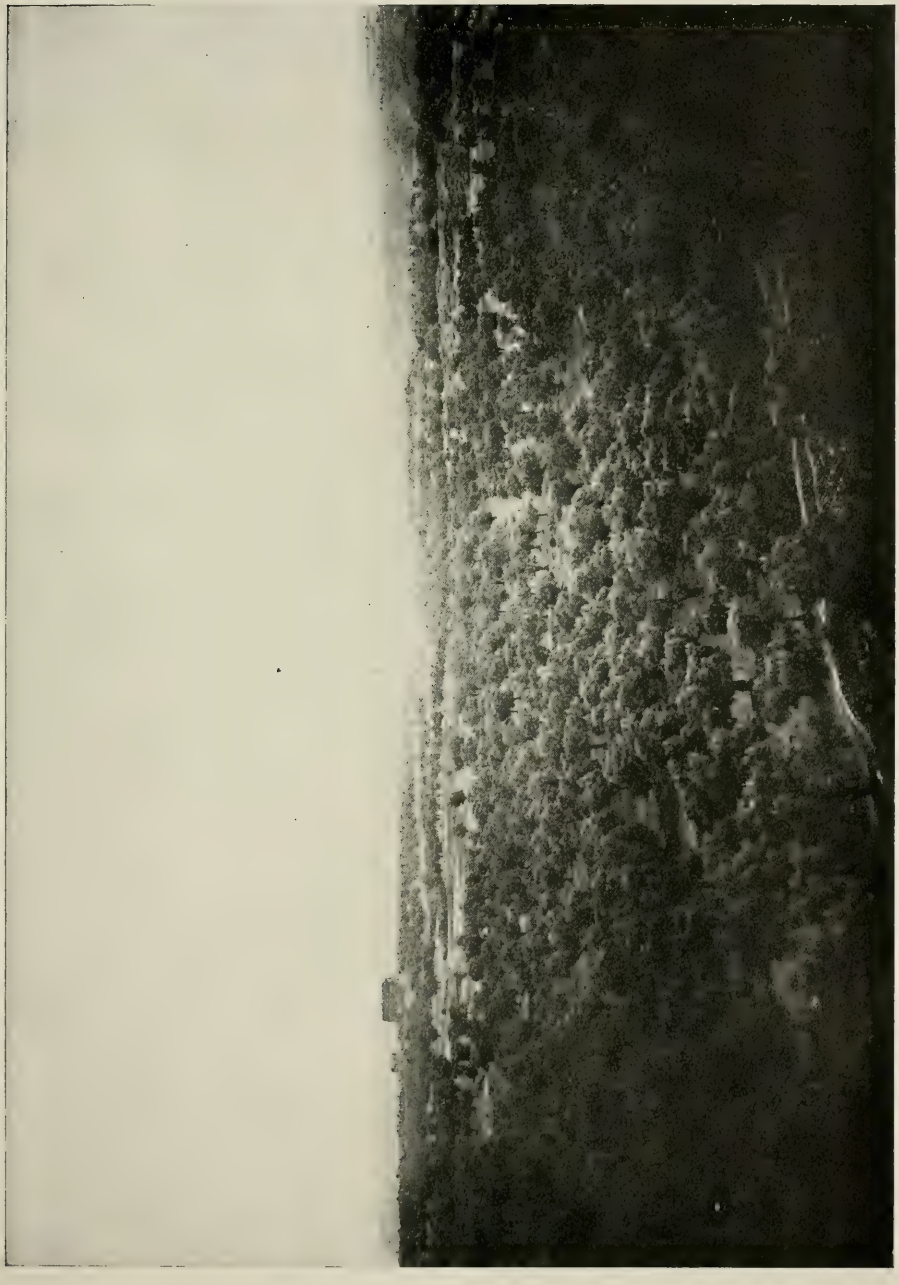
It is probable that this valley was kept in a much higher state of cultivation in ancient times. When the city surrendered to Alexander the Great the figs of Tralles were celebrated throughout the ancient world, and it is a well-known fact that at that time the hills along the whole extent of the Mæander were covered with forests which prevented, in a measure, the destructive inundations which characterize this river today.

Ancient Tralles now lies imbedded under a vast orchard of olive trees. Most of these trees are more than two hundred years old. The ruins extant above the surface of the earth, some standing erect in the shape of pillars and arches, some thickly strewn among the trees, present a picturesque and unique scene. In 1888 some excavations were made, with good results. The ruins, however, have suffered much at different times from earthquakes, and especially on account of being used as building material for the houses of Aidin, and some of the finest columns have been removed and set in the public buildings of that town. Remains of the acropolis, stadium, and theater may still be seen. It was from the latter that Strabo claimed that he could look across the plain of the Mæander and see the people sitting in the theater of Magnesia. On the edge of the plateau still stand three enormous archways which are either a part of a Greek gymnasium or Roman bath. The slabs of marble which ornamented these arches have long since been removed.

Generally speaking, Tralles would be an easy city to excavate. There is no rock formation of a serious character. The earth covers the ruins loosely, and could easily be removed. The olive orchard, with the roots of the trees extending in every direction deep into the ground, would form the greatest obstacle, not only from the point of digging, but as an item of expense, for the reason that these fruit trees would have to be purchased outright from their owners before being destroyed.

Tralles was one of the most important cities in Asia Minor. Its position, half way between the ports of Ephesus and Miletus, on the coast, and the interior cities of the country, must have been favorable always to transient commerce. It was renowned for the wealth of its inhabitants. It was repeatedly destroyed by earthquakes and fires, and as often rebuilt, until about the thirteenth century, when the last catastrophe left the city a mass of ruins.

Since then the remnants have been used in constructing mosques and in



THE OLIVE ORCHARD BENEATH WHICH THE CITY OF TRALLES LIES BURIED

A LIMEKILN AMONG THE RUINS OF TRALLES, SHOWING HOW SOME OF THE MOST BEAUTIFUL MARBLES ARE BEING REDUCED TO LIME

shaping headstones for graves in Turkish cemeteries. For many years past the ruined site has been superficially dug and culled for sculptures and other antiquities, and the fragments found show that they belong to the best period of art. On the roads approaching Aidin there are many fountains, the troughs of which have been hollowed out of the base of columns from the temple of Aesculapius.

At present there is a limekiln in operation among the ruins, and many men are employed in digging up columns of porphyry and slabs of marble with Greek inscriptions, which are all being ground into lime for building purposes. The Turkish governor of Aidin informed me that he had made a futile attempt to stop this work, but that it was being conducted by the military authorities, over which he had no jurisdiction.

In plowing among the olive trees the peasants still turn up innumerable coins, which they sell at trifling prices. Many valuable pieces of statuary taken from Tralles may also be seen in the houses of the better class of people in Aidin, but these are as nothing compared to the number sent to various museums in Europe. And what Tralles has yet given to the world in the way of art treasures is as nothing compared with what still remains entombed, for the city itself lies beneath the earth.

THE RUINS OF WEALTHY LAODICEA

The now deserted city of Laodicea was situated in ancient times upon the great Græco-Roman highway which led from Sardis, in Lydia, through the heart of Asia Minor to the confines of Syria. This roadway, supposed to be of Persian origin, was once the chief means of communication for commercial and military enterprises, being used in turn by the armies of Xerxes, Alexander the Great, Frederick Barbarossa, and many others. The ruins of Laodicea lie upon a commanding elevation, which gives a fine view of the surrounding country. About 8 miles distant stands Mount Cadmus, white with snow, while all that is left of Colossæ rests at its base.

On the other hand, beyond the fertile valley of the Lycus may be seen, glimmering in the sunlight, the huge cascades which plunge over the plateau where the city of Hierapolis is situated. Nestling at the foot of the hill, upon which the acropolis once stood, is the little village of Gonjeli, while away to the south, with the mountain range of Baba Dagh in the background, is the larger Turkish town of Denizli. Both of these places have been practically built from the ruins of Laodicea.

In the spring of the year the valleys and slopes about Laodicea are green with verdure, and the surrounding country, as viewed from the ruins, presents a picture not unfriendly to the eye. In fact, the fields are cultivated up to the walls of the city. But within the city limits, which probably cover an area two miles square, there is not enough vegetation to feed a hungry goat. It is a scene of desolation, where only snakes, lizards, turtles, and prowling jackals now seek refuge in subterranean caverns. The tombstone cutter from Denizli is a regular visitor. Occasionally a camel caravan may be seen wending its way slowly through the ruined streets. But otherwise it is a place long since rejected and shorn of every symbol of former greatness.

Yet Laodicea was once the chief emporium of central Asia Minor. It was the seat of one of the Seven Churches. For something like 1,400 years this city was deemed one of the most important to possess, not only from a military point of view, but also from the standpoint of the sinews wherewith to conduct war. The opulent citizens of Laodicea often fell a prey to the greed of Roman, Tartar, and Turkish conquerors. In times of peace the hardships caused by earthquakes were felt as severely as was the pestilence of war. Yet the people were so attached to their city that they rebuilt it repeatedly out of their own means, and each time in greater splendor than before. It was only when Tamerlane scarcely left one stone upon the other, and when the Turks, about 1230 A. D., slaughtered or sold the inhabitants into

slavery, that the city became what it is today—one vast field studded with heaps of ruins.

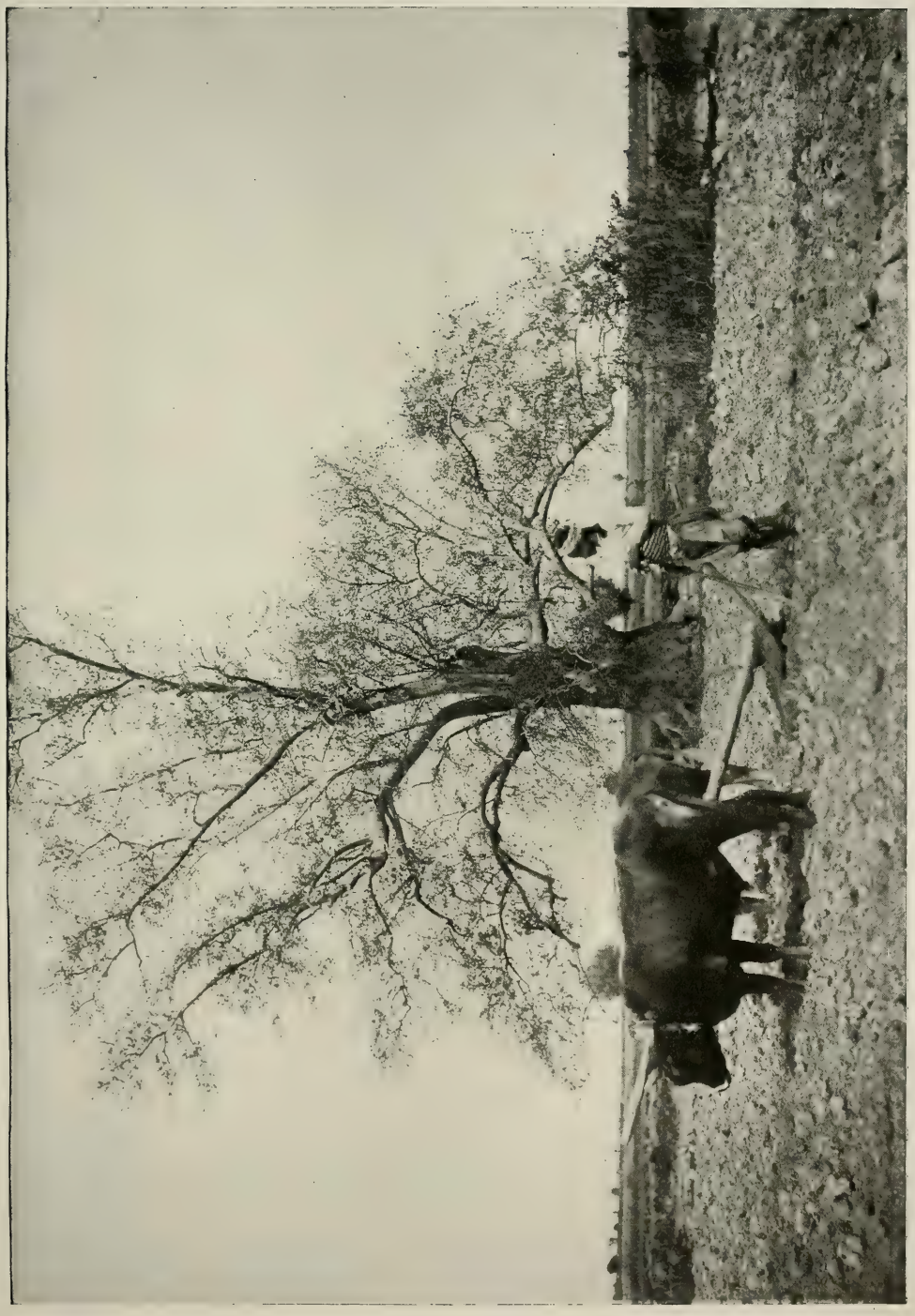
Considering the ravages caused by earthquakes, time, and war, Laodicea, however, even at present, is still in a remarkable state of preservation. The stadium is almost intact. The steps repose in the sides of a hill, which forms a natural base for this monument. The plan of the gymnasium is so well preserved that almost the entire building can be seen. Two theaters, one of which was devoted to music, are practically complete. Scattered over the field, in one mass of entangled ruins, are no end of temples with the base of columns still in place. The ancient aqueduct is partially preserved, and shows clearly how the water was conducted from a long distance upon the hydrostatic principle of its seeking its own level. The aqueduct is not a lofty archway, such as characterize those of Roman origin throughout Asia Minor and Italy, but is built close to the ground, and the water was conducted to the city in massive stone pipes up hill and down from a distant mountain range. In the bed of the little river of Asopos stand the broken piers of a bridge which once led to a Christian cemetery on a neighboring hill opposite the city. The ancient pagan necropolis was situated just outside the city limits, near where the village of Gonjeli now stands. Many interesting sarcophagi have been found and removed to various museums. Laodicea once had three gateways which pierced the solid walls which extended around the circumference of the plateau. The archways of one are still well preserved, but the base lies deeply buried in the earth. Of the great double gateway which opened upon the road leading to Hierapolis, nothing but the buttresses which supported it on either side of the deep ravine which formed the approach to the city may still indistinctly be traced. Over this gateway there was a viaduct which connected the acropolis with the small theater.

As yet nothing has been done by the archæologist in the way of excavating Laodicea. This is surprising when we take into consideration that of all the old cities in Asia Minor none has been or could be excavated with greater ease. The debris and earth which cover the city could be easily carted away and dumped at the foot of the hills. Probably no ancient city would repay the effort more than this one. As at Ephesus, an excavation would probably reveal various periods of architecture, each built upon the other. Certain it is that the buildings which now stand above the earth's surface are more or less of late Greek or Roman origin. Certain it is also that the Laodicea which was founded by Antiochus II some 250 years B. C. was erected upon the site of a much older city.

HIERAPOLIS, THE HOLY CITY

Hierapolis is probably the most interesting spot in Asia Minor. It has always been one of the most fascinating places in the Orient. As the ancients were attracted toward it on account of the matchless mineral springs and awe-inspiring Plutonium, so today the stray traveler seeks it out in order to feast his eyes upon the most perfect ruined city in the world. It is indeed a marvelous city. To the student of history it is an object-lesson unparalleled elsewhere; to the philosopher it is an inexhaustible mine of contemplation; to the ignorant nomad who wanders in these parts it is an actual example of the power of magic; to the archæologist it means nothing, at least that which is visible to the eye, for the reason that what he seeks lies beneath a calcareous incrustation which paves the whole plateau, and belongs to a far anterior period than the present ruins.

Hierapolis is a veritable city of the dead. Outside the walls, there are no less than four immense necropolises in a splendid state of preservation. Naturally every mausoleum and sarcophagus has been opened and plundered centuries ago, but it was done in such a manner that the tombs were not destroyed, and they may be inspected today in exactly



A TYPICAL PLOWMAN OF ASIA MINOR

A VIEW INSIDE THE THEATER: HIERAPOLIS

the same condition and place of repose as they occupied nearly 2,000 years ago. There were two main entrances to the city, and the chief street extended through the center from gate to gate. This street was once embellished with some of the finest public buildings, and after the introduction of Christianity it was graced by two large churches. The early Christians were not, however, permitted to erect their first church within the city limits, but were compelled to build it outside the walls. This church was built upon the spot where the Apostle Philip was martyred, and the ruins today are in a very good state of preservation.

The ruined city of Hierapolis may be reached from Laodicea after about five hours' horseback ride. In ancient times a splendid roadway connected the two cities, the only traces, however, now extant being the buttresses of a bridge which once spanned the Lycus. During the rainy season, which lasts from November 15 to March 1 in that part of the country, it is practically impossible to cross the valley, for the reason that it is rendered impassable by the overflow waters of the Lycus.

THE CASCADES OF HIERAPOLIS

The cascades of the city are visible from a long distance, and as one approaches them the more impressive they become. At a distance of two miles they have the appearance of some huge cataract, not unlike that of Niagara, and if seen in April, when the grass is green upon the slopes beyond, the whole presents a wonderful picture. The cascades are white as snow.

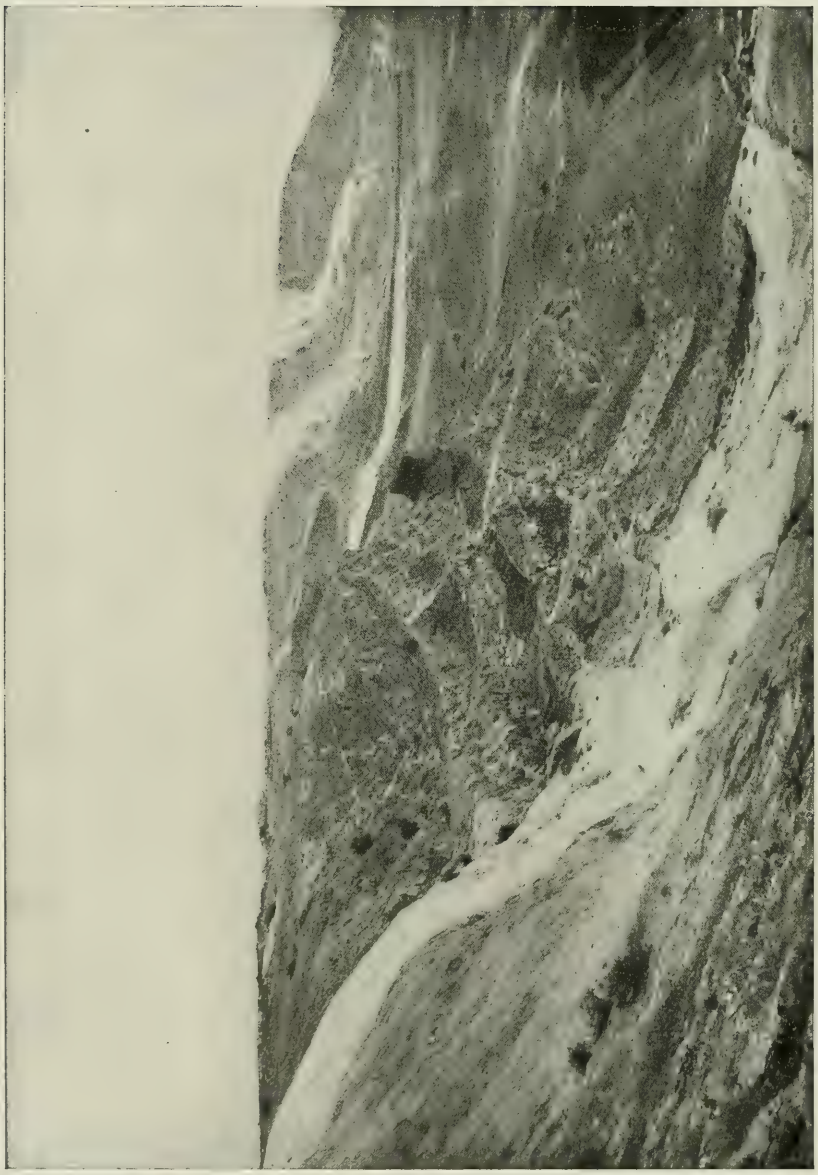
Some idea may be had of this phenomenon when I state that the falls are 1½ miles in length and 525 feet high; in other words, a stupendous cataract turned to stone. It must have taken many cycles of time in the course of nature for the deposits contained in those mineral springs to slowly transform the whole precipice into a state of petrifaction. And it was upon this broad terrace that a very ancient race of people must have built a city, of which there appears no chronological record. Hierapolis is first heard of in history about 200 years B. C., and at that time it rivalled the splendor of Laodicea. It is supposed that the primitive city is entombed beneath the thick calcareous layer of stone.

I have read several descriptions of Hierapolis which have been written at different times during the past 80 years, but none of them seem to apply, in many respects, to the present state of things. For example, one explorer says that he ascended to the ruins by a precipitous path, and that the terrace upon which the city stood was prettily wooded with olive trees. If such was the case at that time, it certainly is not true today; and as the deposits from the mineral springs have blasted the entire plateau with sterility, it does not seem probable that such was ever the case. Certainly not since the city ceased to be inhabited, and the waters, being no longer kept in well-defined channels, were permitted to run riot among the abandoned buildings and to plunge over the cliff at will. As olive trees grow to be two or three hundred years old, it seems that traces of the same might easily be seen. This description probably applies to the little Turkish village of Edscheli, which lies at the foot of Hierapolis, in the midst of an olive grove, well protected from the warm water of the springs which flows near by toward the Lycus.

THE WONDER OF THE ANCIENTS

Of the Plutonium, which was the wonder of the ancients, there is now no trace whatsoever. Strabo tells us that in his day the inhabitants of Hierapolis regarded the warm waters and the Plutonium as two phenomena which bordered on the miraculous. The waters were so ready, he says, to petrify everything, that by running them through artificial ditches around the fields channels of solid stone were soon formed.

The Plutonium, he continues, was situated in the low crest of a neighboring hill, and consisted in a small orifice, yet sufficiently large to admit the body of a



THE WONDERFUL CASCADES AT HIERAPOLIS, ONE MILE AND A HALF IN LENGTH, 525 FEET HIGH
(SEE PAGE 749)

ANOTHER VIEW OF THE STUPENDOUS STONE CASCADES AT HIERAPOLIS: THE EASTERN DIVISION

full-grown man. Around this opening in the earth there was a balustrade about 50 feet in circumference. From the earth there issued a species of smoke which was so thick that one could scarcely distinguish the earth which was enclosed within the balustrade. The vapor did not molest those who approached when the weather was sufficiently calm to enable it to rise in a column in the air. If an animal, such as a bull, were put in, it died immediately.

Strabo further says that he often tested the powers of the Plutonium by causing sparrows to fly into it. They invariably died the moment they came in contact with the smoke.

It is probable that the Plutonium in ancient times was situated at some place between the theater and where the springs rise up today, although, as has been said, there is now no trace of it to be found. Another version is that it was destroyed by the Christians in the early part of the fourth century. Again, it is claimed that in Roman times, or about 250 A. D., when the city was at the height of its splendor, the Plutonium and the warm springs were one and the same thing; that is, in other words, the warm water flowed out of the mouth of the Plutonium itself. Be that as it may, the whole question seems now, more or less, to be one of mere speculation.

THE WARM SPRINGS

The warm springs of Hierapolis are still noted for their healing qualities, especially for rheumatism. Even today the nomads of Asia Minor come and pitch their tents within the ruins, and remain for months at a time in order to enjoy the waters.

A bath in these springs is a never-to-be-forgotten luxury, something no traveler denies himself when visiting the place, a thing in itself which well repays the hardships of a journey thither.

Among the peasants who live in the village of Edscheli, at the foot of the falls, there exists the belief that in a certain part of the pool there is no bottom. This belief has been handed down from generation to generation. It is easy to account for this conviction among the peasants, because there are spots in the basin which are certainly very deep. Apart, however, from this, the edges and bottom of the basin have another peculiar interest.

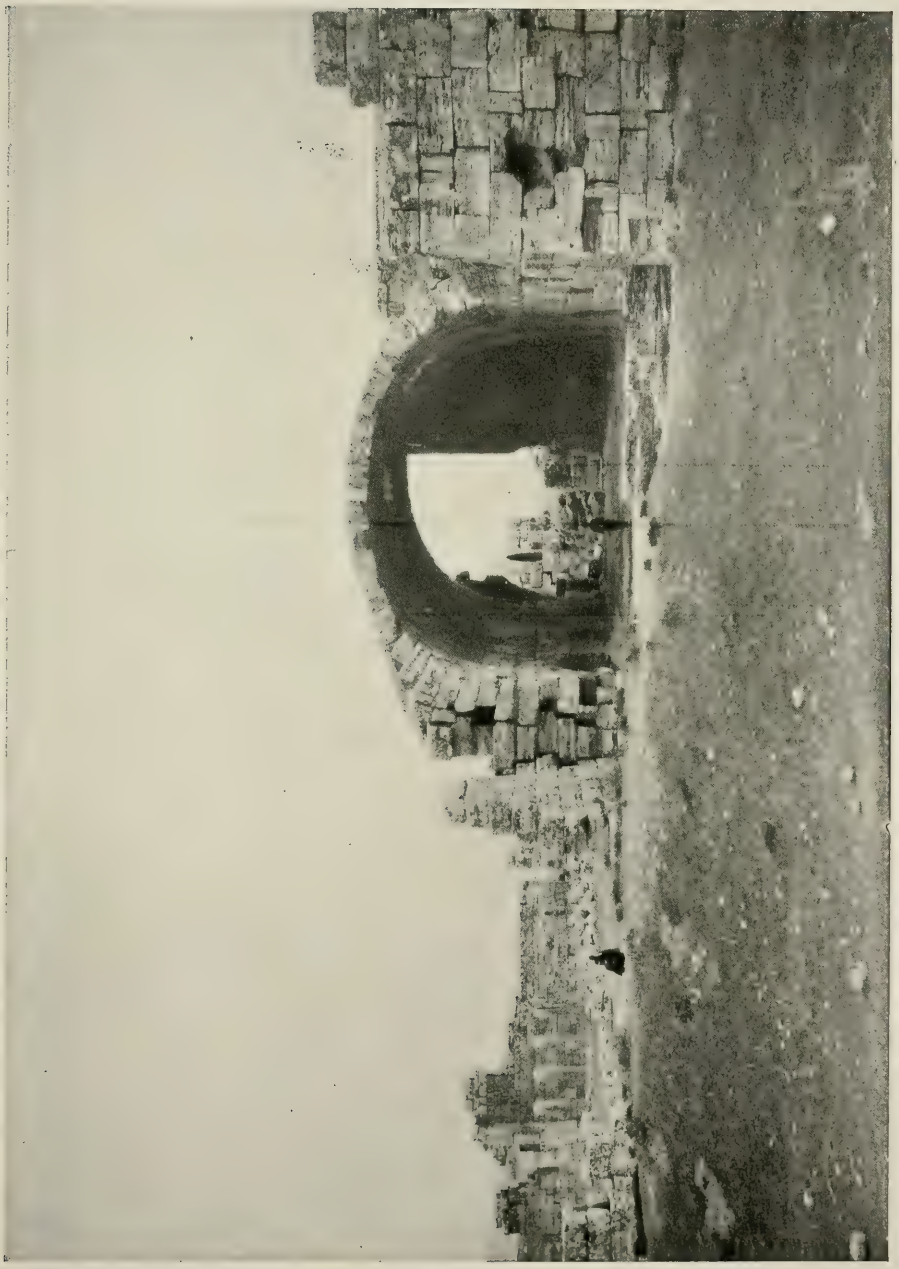
As far as the eye can see through the clear water, the bottom is literally covered with heaps of ruins. Immense pillars and marble slabs with interesting inscriptions lie one upon the other, and, as nearly as can be judged, all are in a perfect state of preservation. The protecting waters have thus far prevented the stone-cutter from tapping this inviting mine.

The temperature of the water is 91 degrees Fahrenheit, and it remains so during the entire year. The water is not unpleasant to the taste, but it is probably just as well if one refrains from drinking much of it. The springs are sulphurous, and this leads one to think that there is some truth, after all, in the statement that the waters flow from the mouth of the ancient Plutonium. The waters are also highly carbonate, the gas continually escaping. The only vegetation upon the terrace is some small sea grass which immediately surrounds the basin. Wisps of the same, coming into contact with the water, have been completely petrified, and may be gathered as mementos.

The Thermæ, or baths of Hierapolis, were erected with wonderful precision and care, and remind one of similar structures still to be seen at Rome. They consist of immense halls and lofty archways. There must have been huge swimming tanks filled with running water from the near-by springs. It is difficult to conceive of more splendid baths, either in ancient or modern times, than those of Hierapolis must have been. The building probably dates from the reign of Antoninus Pius. The marble facing has long since been removed.

THE THEATERS AND MAUSOLEUMS

In traveling over this country one cannot fail but be impressed with the magnificence of the theaters once erected by



THE BATHS AT HIERAPOLIS

HIERAPOLIS: THE MINERAL SPRINGS, TEMPERATURE 91 DEGREES FAHRENHEIT (SEE PAGE 752)

the inhabitants of the early Greek kingdoms of Asia Minor. There were numerous porticos which protected the people from the sun and storms, and fountains which tempered the heat of the climate. When these theaters were at the height of their splendor the hills above them abounded in cool, shady nooks. Such was the theater at Hierapolis, which, with the single exception of the excavated theater at Miletus, is the most perfect structure in Asia Minor. To begin with, it evidently has not been laid waste by the hand of man. The entire front of the building has apparently been shaken by earthquakes, as a portion only of the proscenium still stands, the rest being a mass of ruins. The passageways which led through the beautifully arched entrances are still intact, and are decorated with festoons and foliage. The orchestra is filled with rubbish, but it is only the accumulation of time. Among the innumerable fragments of the stage architecture there are many bases of spiral and Ionic columns, as well as bas-reliefs of Roman style.

With the exception of the roof, the church of the Apostle Philip stands intact, and some fresco work may still be seen in one of the little chapels. The place is now inhabited by a band of wandering nomads who have pitched their tents close to the western wall. Their horses are stabled within the ancient church itself.

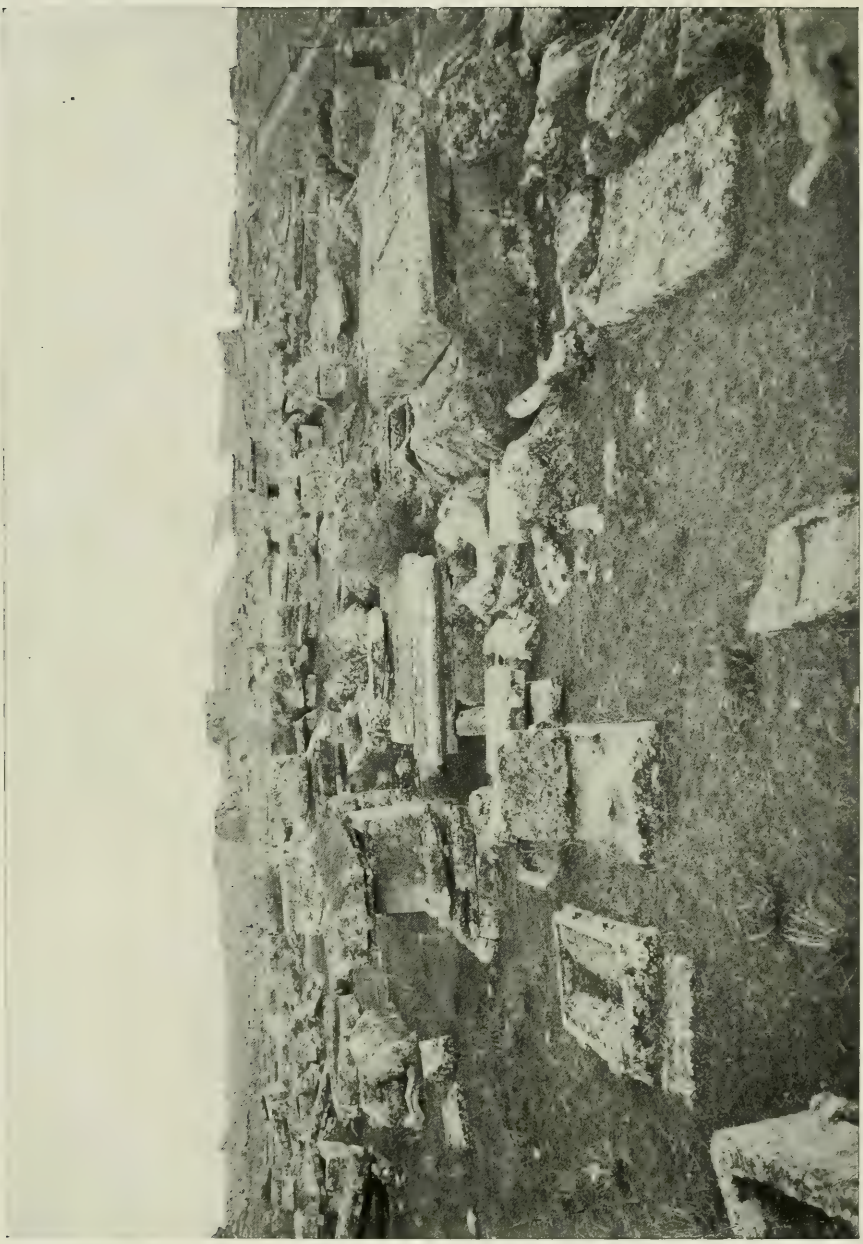
One of the four necropolises at Hierapolis is probably the best preserved in the world. Some of the finest of the mausoleums still stand erect and in as perfect a state of architecture as when first constructed. The long epitaphs on most of them may be read as distinctly as if they had been engraved but yesterday. Some of them are huge affairs and contain benches and vaults, all in perfect preservation. I remember one in particular which belonged to a rich patrician of Apollonia. There are, however, many others equally as interesting, and it is only to be wondered at that the columns and marbles, with their many inscriptions, have not been removed by the ravaging hand of man. Perhaps some of the inscriptions which threaten wanton hands with eternal punishment have had the effect of scaring away would-be desecraters, but they did not have sufficient terrors to keep the sarcophagi from being robbed of their valuables.

Hierapolis contains many other edifices of peculiar interest. On the heights overlooking the city there is an old acropolis. Behind the church of the Apostle Philip there is an ancient theater.

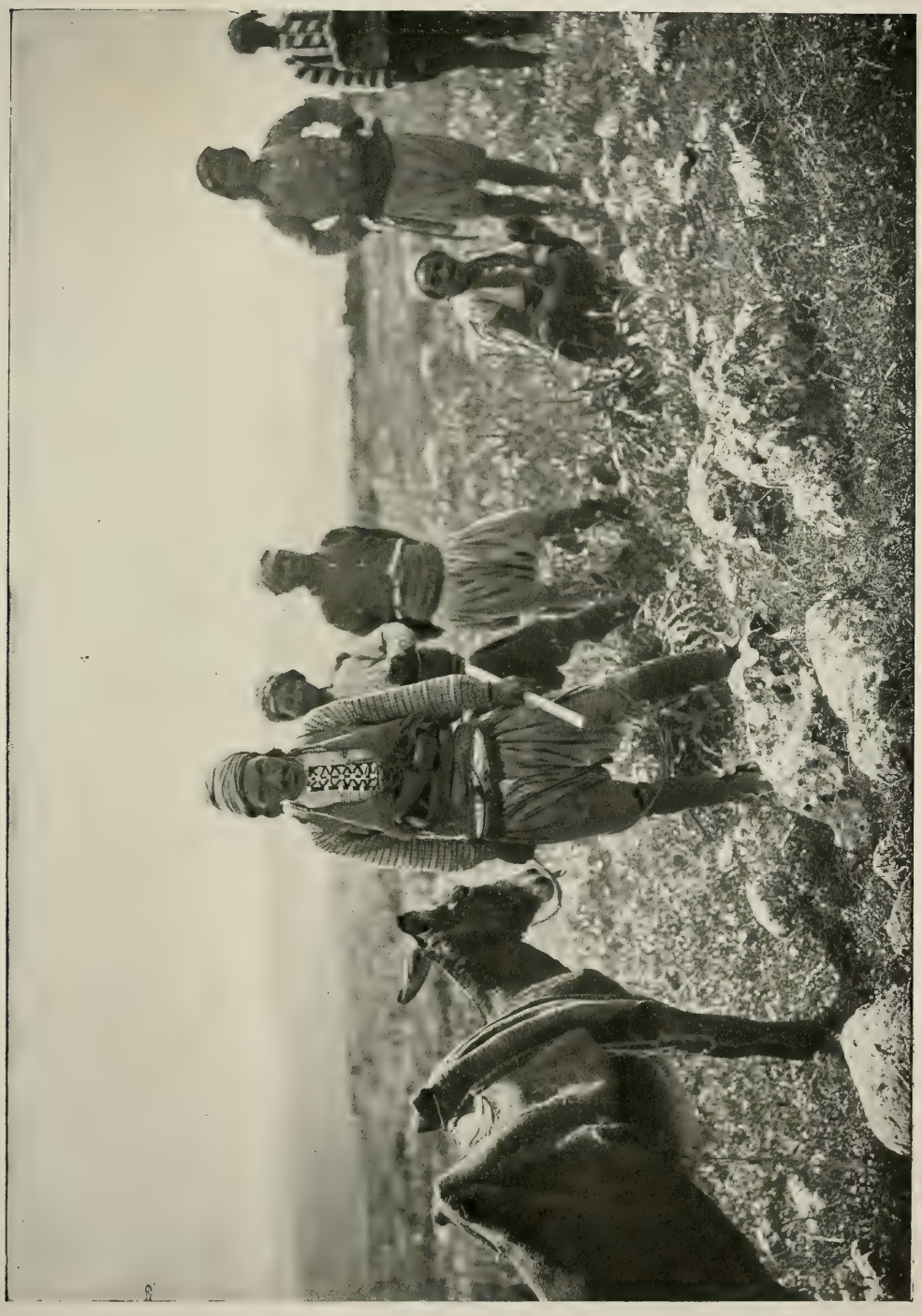
At the edge of the precipice, not far from the baths, there stands a medieval castle fairly well preserved. It was probably erected from some of the older ruins, perhaps by the Crusaders, and is remarkable only as a contrast in solidity of construction as compared with the theater or church. If left to the lapse of time, the Greek and Roman ruins will be standing as today long after the castle has disappeared. Over a deep gorge to the east may be seen the buttresses of an ancient bridge which led out to the Laodicea road, the full outlines of which may still be traced along the hillside.

Hierapolis has had a stormy history. During the reign of Nero, Hierapolis was destroyed by an earthquake, and rebuilt with the assistance of the state. Frederick Barbarossa once fought a battle at the foot of the falls.

Hierapolis, as well as Laodicea, was famous for wool and for dyeing cloths. The people were thrifty and full of enterprise. One manufacturer of Hierapolis tells us on his mausoleum that he had visited Rome no less than 72 times in the interest of his business. That man would be worth the weight of his mausoleum in gold if he were alive today and we could secure him to push American commercial interests in Asia Minor! The population of the city seems to have been employed chiefly in spinning and weaving. Such were these cities once. Today they are forsaken, and the intervening valley, one of the richest spots on earth, is nothing but a dreary waste. Speaking of the splendors of these cities at one time, no less an authority than Gibbon says:



CITY OF THE DEAD: HIERAPOLIS. A PORTION OF THE CASCADES IS SEEN IN THE DISTANCE



WANDERING SHEPHERDS OF ASIA MINOR

THE SPLENDID CITIES OF THE EAST

"The provinces of the East present the contrast of Roman magnificence with Turkish barbarism. The ruins of antiquity scattered over uncultivated fields, and ascribed by ignorance to the power of magic, scarcely afford a shelter to the oppressed peasant or wandering Arab. Under the reign of the Cæsars, the proper Asia alone contained five hundred populous cities, enriched with all the gifts of nature and adorned with all the refinements of art. Eleven cities of Asia had once disputed the honor of dedicating a temple to Tiberius, and their respective merits were examined by the senate. Four of them were immediately rejected as unequal to the burden; and among these was Laodicea, whose splendor is still displayed in its ruins. Laodicea collected a very considerable revenue from its flocks of sheep, celebrated for the fineness of their wool, and had received, a little before the contest, a legacy of above £400,000 ($2,000,000) by the testament of a generous citizen. If such was the proverty of Laodicea, what must have been the wealth of those cities whose claim appeared preferable, and particularly of Pergamus, of Smyrna, and of Ephesus, who so long disputed with each other the titular primacy of Asia?"*

The situation of Hierapolis is unique, and the view from the terrace is one not easily forgotten. The Coliseum at Rome looks beautiful in the moonlight; whoever stands upon Vesuvius and beholds Pompeii and Herculaneum as they lie in one vast cemetery far below, with the Bay of Naples and Capri in the distance, thinks the scene one of surpassing beauty; the castle of Edinburgh overlooks an historical city environed within an amphitheater of hills; the Kœnigsstuhl at Heidelberg looks down upon the distant Rhine and all its associations. All these I have seen, and more, but Hierapolis may lay claim to be in a class to itself. I have seen this sepulchred city in the moonlight, too, when the orb of night rose beyond Mount Cadmus and stood above Laodicea, casting its full light across the valley upon a plunging cataract, only there was no sound, no roar. This cataract, like the city above, was silent, frozen, turned to stone. The stillness of the night was only broken occasionally by the howl of some savage dog which had taken refuge in an ancient tomb. The glimmering Lycus and the snow upon the distant peaks of the Salbacus range but tempered the scene with their reflecting rays. It is a place for retrospection, and the mind lightly conjures up images of the martial hosts of Cyrus the Younger or the more peaceable missions of Herodotus and Strabo. The fact that one is away off in the heart of southern Asia Minor, far removed from modern civilization, yet amidst the chief legacies of an ancient one, lends a charm to a journey thitherward which is not always an asset in the ordinary routes of travel.

An excursion to Hierapolis is not an easy matter. To begin with, the consent of the authorities is necessary, for the trip can only be made under the protection of a strong escort. This escort is indispensable, because of brigands and savage dogs. While there is less brigandage in the interior of Asia Minor than there is in the districts immediately surrounding Smyrna, yet the country is very unsafe on that account, and if the traveler ventures out alone he does so at his own risk. I have never seen such ferocious curs in all my life as I saw among the necropolises of Hierapolis. There were dozens of these savage dogs, and they belong to the Yuruks, or nomads who dwell in tents among the ruins. The beasts are only partially quiet when the Yuruks accompany the visiting party, but one must always have a revolver ready to shoot at a moment's notice, for they hang about and watch every movement, and their growls and actions are such as to make the stay at the west necropolis extremely unpleasant. One's chief desire under these circumstances is to shoot every cur in sight, but such a

* The Decline and Fall of the Roman Empire.

WAITING FOR A TRAIN : ASIA MINOR

Photo from Mrs Charles Schaffer

procedure would but bring about some shooting on a larger scale than might be comfortable, for the Yuruks are very much attached to their dogs. As they are all heavily armed, and would not hesitate to defend the dogs, it is always best, therefore, for the visitor to be meek and peaceful.

From the archæologist's point of view I have been informed that Hierapolis is a negative quantity. The ruins are chiefly Greek and Roman, and it is impossible to excavate the city, which belongs to an earlier period, on account of the hardened calcareous deposits. One could only dig by blasting, and such a method would result in shattering the ruins. The only possible way in which such work could be carried on would be by tunneling under the surface and removing the prehistoric finds piecemeal from the cliff.

During my stay of five days in this part of the country I was shown every attention by Mr Pantasopoulos, of Denizli, who, by the way, has one of the finest flour mills in Asia Minor, partly equipped with American machinery. He very kindly assisted me in getting horses, provisions, etc., for an excursion to the ruins, and I am indebted to him otherwise for much courtesy.*

* To be continued in the December number.

BULGARIA, THE PEASANT STATE

NO PEOPLE have greater cause for satisfaction and honest pride in what they have accomplished during the last 30 years than have the Bulgarians. Their progress in self-government and education since 1877-8, when, with the aid of Russia and Rumania, they threw off the Turkish yoke, is one of the most remarkable records ever made by any people within a similar space of time. Industry, courage, and compulsory education have won for them a position unsurpassed by any country of their size, and have made them in less than a generation a powerful, and perhaps the determining, factor in the settlement of the Eastern question.

When the Turks were driven out of Bulgaria after 500 years of misrule and anarchy, and the Bulgarians were allowed a semi-independence by the Congress of Berlin, they found themselves very poorly equipped to form a new nation. Without money, with only a few educated leaders and the mass of peasants illiterate, surrounded by jealous and much more powerful states, their future independence seemed remote, if not impossible of achievement. But the leaders had grit and common sense, and realized that there were three essentials: (1) To educate the people; (2) to grant religious tolerance to all, and (3) to require of every man two or three years' military training, so that every Bulgarian would be a capable soldier in time of need.

As a result of the rigorous system of education which was inaugurated, practically all young Bulgarians can now read and write. Whereas in 1879 there could not have been 20 per cent of the male city population able to read and write, today 92 per cent of the male city Bulgarian population between the ages of 10 and 30 can read and write and 74 per cent of the female, and 68 per cent of the male and 18 per cent of the female rural. This is a result which none of the countries, neighbors of Bulgaria and others to the west, can show.

In 1906 there were 4,584 elementary schools, with 8,785 teachers and 400,216 pupils. Nearly 10 per cent of the population are attending primary school.

In 1879 there was only one school in the whole country which could pretend to the title of gymnasium. There are now eight gymnasiums for boys and five for girls, four normal schools for preparing competent teachers for the primary schools, a seminary, two special commercial schools, and a university with three faculties—history and philol-

Photo from "The Balkan Trail," by Frederick Moore (Macmillan)

BULGARIAN INFANTRY

Bulgaria maintains a standing army of 52,000. But as every Bulgarian must serve two years in the army in his early manhood, and is furthermore liable for reserve service until 40, the government could within one month after declaration of war put into the field a force of 400,000 drilled and most effective soldiers. For a country having a population of only 4,200,000 this is an extraordinary showing.

Photo from "The Balkan Trail," by Frederick Moore (Macmillan)

COUNTING ANIMALS FOR MILITARY SERVICE: BULGARIA

ogy, physics, mathematics and natural history, and law.

The university, founded in 1887, is attended by 700 students, among them several women, who three years ago were admitted on an equal footing with the men. The state spends for this university 500,000 francs, or $100,000, yearly.

Every registered Bulgarian subject is a free elector, and every one who can read and write is eligible to all institutions provided by the constitution.

In appreciating the progress made in Bulgaria, it must be borne in mind that the country is situated within a very absorbing political atmosphere, which has certainly been a drawback to its fuller development.

Twenty-five years ago the country had recourse to foreigners for professors, engineers, men of law, financiers, and specialists for all the administrative branches—financial, industrial, economical—and for the organization and command of public forces. Now all this work is done by specially educated Bulgarians. There is not a foreigner in the service of the state.

Bulgaria is a little larger than Indiana. Its area of 38,333 square miles contains a population of 4,200,000. The country, for its size, is mountainous. It is traversed by the Balkans from west to east, and bounded to the west by the Rhodope chain. The highest peak is 8,930 feet.

The density of the population is 105 to the square mile; 73 per cent of the people are engaged in agriculture; 10 per cent are occupied in industrial pursuits; 5 per cent in commercial; 2 per cent in the professions; 2½ per cent in the military and public services; 1½ per cent in

Photo from "The Balkan Trail," by Frederick Moore (Macmillan)

SCENE IN THE MARKET PLACE OF SOFIA, THE CAPITAL OF BULGARIA

transportation business, and 6 per cent in various work.

Of the area, 33 per cent is under cultivation; 29 per cent is covered by forest or wood; 10 per cent is pasture land, and 27 per cent is covered by the roads, beds of rivers, fallow and waste lands.

Agriculture, the main source of wealth of the country, is still in a primitive condition. Want of capital has retarded improved methods and machines, but the Bulgarian government is diligently striving to educate the peasants by agricultural schools, by sending out itinerant professors and inspectors of agriculture, and by distributing better kinds of seeds, etc.

Large estates held by individuals are unknown. The land is owned by the peasants, the average holding being about 18 acres. There are no paupers except in the large towns.

"The character of the Bulgarians presents a singular contrast to that of the neighboring nations. Less quick-witted than the Greeks, less prone to idealism than the Servians, less apt to assimilate the externals of civilization than the Rumanians, they possess in a remarkable degree the qualities of patience, perseverance, and endurance, with the capacity for laborious effort peculiar to an agricultural race. The tenacity and determination with which they pursue their national aims seem likely in the end to give them the advantage over their more brilliant competitors in the struggle for hegemony in the Peninsula. Unlike most southern races, the Bulgarians are reserved, taciturn, phlegmatic, unresponsive, and extremely suspicious of foreigners. The peasants are industrious, peaceable, and orderly; the vendetta as it exists in Albania, Montenegro, and

Photo from "Through Savage Europe," by Harry De Windt (Lippincott)

A BULGARIAN PEASANT

There are no large landed proprietors in Bulgaria: the average holding is 18 acres

Photo by F. J. Koch

PRIEST AND PEASANT: TIRNOVO, BULGARIA

Tirnovo was the ancient capital of Bulgaria. It was here that Prince Ferdinand was crowned "Czar of the Bulgarians," resuming the title which had ceased when the Ottomans conquered Bulgaria 510 years ago. The Bulgarians are of the Slavic race, but get their name from the Bulgars, a people of Finnish stock, who came from the southeastern steppes of Russia about 800 A. D., and established a powerful state across the Danube. The Bulgars eventually lost their individuality, being merged into the more numerous Slavs.

Macedonia, and the use of the knife in quarrels, so common in southern Europe, are alike unknown."*

* J. D. Bourchier, many years correspondent of the London Times in the Orient, in Encyclopedia Britannica, Vol. 26.

The Bulgarians owe much to the American missionaries, both directly and indirectly. For one thing, the Americans have excited, without intention, the jealousy of the Orthodox Church, which has undoubtedly assisted in keeping the

BULGARIAN SOLDIERS QUARTERED AT THE RILO MONASTERY, STANDING FOR GRACE BEFORE SUPPER

"A few minutes before the supper-hour pots of stew or soup, or other army rations, were set in a row on the stone pavement. When the call to mess was sounded the soldiers fell in behind the pots, each with half a loaf of bread and a tin spoon, and stood facing the chapel. The drums beat again, and with one accord the line of yellow-coated men doffed their caps. Their officer, likewise reverencing, pronounced the grace, and the company made the sign of the cross three times in drill regularity. The men then seated themselves, eight round a pot, and began their meal in the golden light of pine torches fastened to the great pillars which support the balconies."—FREDERICK MOORE.

A CORNER OF THE MONASTERY AT RILO Photos by F. J. Koch

IN THE COURTYARD OF THE RILO MONASTERY

This monastery at one time sheltered several hundred monks, but since Bulgaria obtained her freedom the number has dwindled to about 50. The great building was built for siege generations ago. It was, however, always exempt from ravage by Turkish troops.

ON THE ROAD NEAR PLEVNA, BULGARIA Photos by F. J. Koch

The woman is spinning the thread for the home-made dress as she walks to town

SCENE IN A BULGARIAN VILLAGE

SCENE IN SOFIA. NOTE THE PARIS PARASOL Photo by F. J. Koch

When Bulgaria became semi-independent in 1878, Sofia was a very dirty town, with streets unpaved or paved with rough cobble stones, and with but one house of any pretensions, the Turkish "konak." Today, besides a palace and a parliament building, there are a national bank, a post-office, a military academy, several vast barracks, and many other government buildings. There are parks and public gardens where bands play on summer evenings; new streets and avenues have been laid out, and some of the narrow ones of Turkish times have been widened; substantial shops and hotels mark the business quarter, and modern homes the avenues.

priests active in developing their own educational institutions. It was not until the American missionaries opened a school for girls in their land that the Bulgarians began to educate their women. But that was many years ago, before Bulgaria became a quasi-independent state; now the state schools afford every advantage the Americans can offer, except the American language.

The freedom of religious opinion granted throughout the little kingdom is described by Frederick Moore in "The Balkan Trail:"

"The Bulgarian government attempts to administer justice to all denominations and to maintain religious equality before the law, and the government comes fairly near to this aim. The Greeks complain that Greek schools are not subsidized, but Turkish schools are maintained by the state.

"It is due to the freedom of religious opinion existing in Bulgaria that the mis-

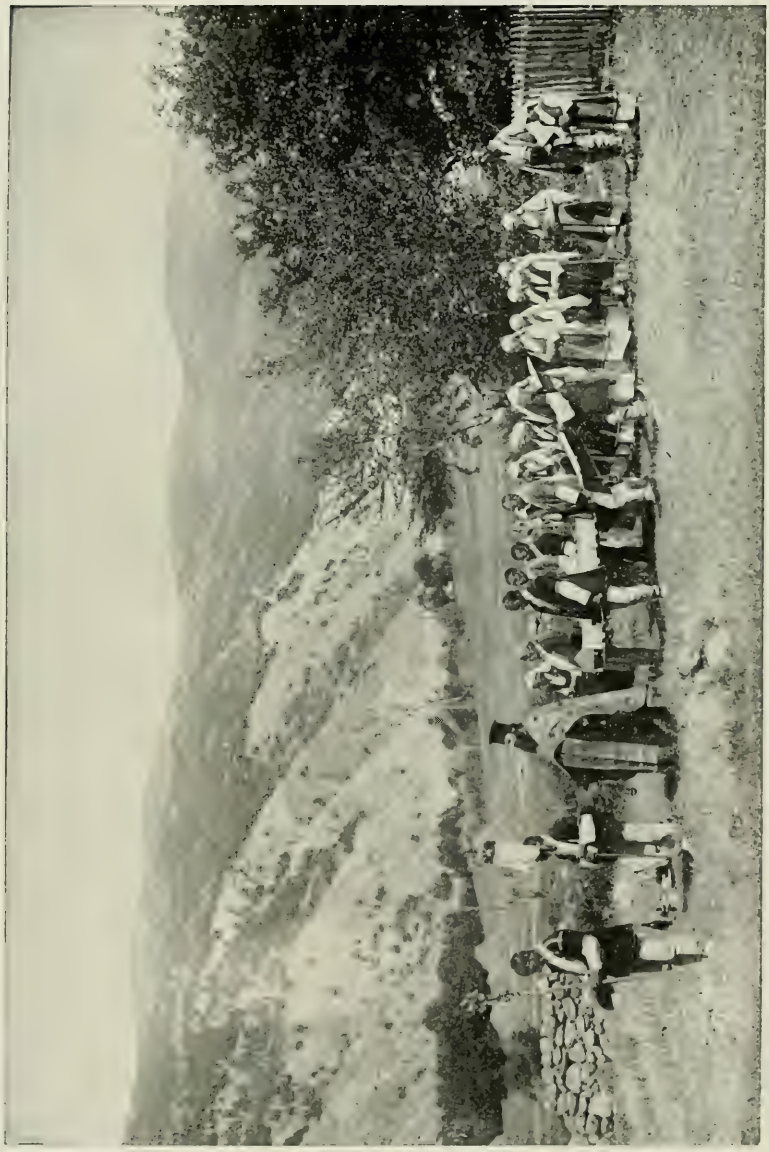


Photo from "Through Savage Europe," by H. De Windt (Lippincott)

A BULGARIAN FUNERAL

Photo from "Through Savage Europe," by H. De Windt (Lippincott)

DANCING THE KOLO, THE BULGARIAN NATIONAL DANCE

Photo from "Through Savage Europe," by H. De Windt (Lippincott)

A BULGARIAN BELLE IN HER GARDEN

sionaries have become so closely allied with the Bulgarians, for in no other Balkan country, except perhaps Rumania, is there the same liberty of thought. The Servian government prohibits by law all proselytizing to Protestantism. The Greeks—though they welcomed the aid and sympathy of the missionaries in the Greek war of independence—have since enacted laws which make the teaching of "sacred lessons" in the schools compulsory, lessons of a character which the missionaries refuse to disseminate. The Sultan would not tolerate the missionaries in his dominions if they attempted to convert Mohammedans, while the few Turks who have deserted Mohammedanism have mysteriously disappeared; and it has been found almost impossible to convert Jews.

"So the missionaries are left only the Bulgarians on whom to work. Their schools and churches are open to other nationalities in both Bulgaria and Macedonia; but for the double reason that they are institutions of Protestants and of Bulgarians very few of the other races ever seek admission.

"There are few Jews in Bulgaria as compared with the number in the border State of Rumania; the Jews cannot thrive on the close-fisted Bulgars. The Jews who live among them are fairer in business transactions than their co-religionists anywhere else in the Balkans.

"The Mohammedan in Bulgaria is better off than his brother in Turkey, who, except that he holds the position of the man with the gun, suffers under the Ottoman rule almost or quite as much as does the Christian. Nevertheless, there is a continuous exodus from Bulgaria of Turks and Pomaks (Bulgarians converted to Mohammedanism) to the land where the Mohammedan rules. And when these Turks pack their goods and chattels and start to trek, they do not stop until they have passed beyond the Bosphorus. They seem to think—as many men have thought for many years—that the day of Turkish power in Europe will soon be past.

"Bulgarians of intelligence and education put little faith in the promises of the present Russian government. But Russia holds a fast grip on the masses of the people; the peasants are grateful for their deliverance.

"But the model of the Bulgarians is by no means the great Slav country. They can boast of having attained in a quarter of a century a liberty which the Russians have not yet secured. The institutions of Bulgaria are liberal in principle, and often in practice; the constitution is democratic. The suffrage is extended to every male adult, as a result whereof seven Turks represent the Mohammedan districts of the Danube and Turkish border in the Sobranje, and sit among the other deputies without removing their fezzes."

Mr H. De Windt, author of "Through Savage Europe," was likewise impressed by the enterprise of the Bulgarians:

"This country (Bulgaria) will not stand still; not a year, nay, not even a month, passes that important reforms and improvements do not occur in her government and the efficiency of her formidable army. It was suggested to me while traveling through Rumania that an alliance may one day take place between the latter country and Bulgaria; and in this case even a great power, in the event of hostilities, would surely find her hands full.

"A glance at the statistics of Bulgaria will show how far she surpasses neighboring countries in energy and enterprise. What with factories, cultivated land, horse and cattle breeding, mines, exploited forests, public works, and compulsory education, the budget is already in proportion to the progress of the country. Greece and Servia no doubt have budgets nearly equal to that of Bulgaria, but their public debts are far greater, with smaller territories and populations, and consequently less wealth. The public debt here amounts to 78 francs per head; that of Russia is more than double this amount. In 1880 the exports and imports of Bulgaria amounted to only 32 millions (francs); in 1904 they had risen to 390 millions (francs)!"

SERVIAN GIRLS OF NISCH, SERVIA Photo by F. J. Koch

SERVIA AND MONTENEGRO

SERVIA is about the size of Vermont and New Hampshire combined, while Montenegro would make only three Rhode Islands. Little Montenegro has the proud distinction of never having been conquered by the Turks.

Both countries are peopled by the Serbs, a slavic tribe, who entered the country about 650 A. D. at the invitation of Emperor Heraclius, who planned them as a bulwark against the Avars. During the twelfth to fourteenth centuries the kingdom of Servia embraced Bosnia, Albania, Macedonia, Thessaly, part of Bulgaria, and all of the Greek peninsula except Attica and the Peloponnesus. When the Turks overran the country a band of Servians withdrew among the mountains now known as Montenegro. Among these peaks, which range from 2,500 to 8,000 feet in height, they successfully defended themselves against repeated atttacks from the powerful Ottoman Sultans.

Servia resembles Bulgaria and Rumania in not having any large landed estates. All the arable land is divided into small holdings, not exceeding on the average 20 acres. One of the conditions under which Servia obtained her independence in 1878 (by the Treaty of Ber-

SERVIAN PEASANTS IN BELGRADE, THE CAPITAL OF SERVIA

Come to town on a holiday

A GIPSY IN SERVIA

There are thousands of gipsies in each of the Balkan states. They do no work and earn their living by begging and stealing

Photos by F. J. Koch

Photo by F. J. Koch

THE METROPOLITAN ON CORONATION DAY: BELGRADE, SERVIA

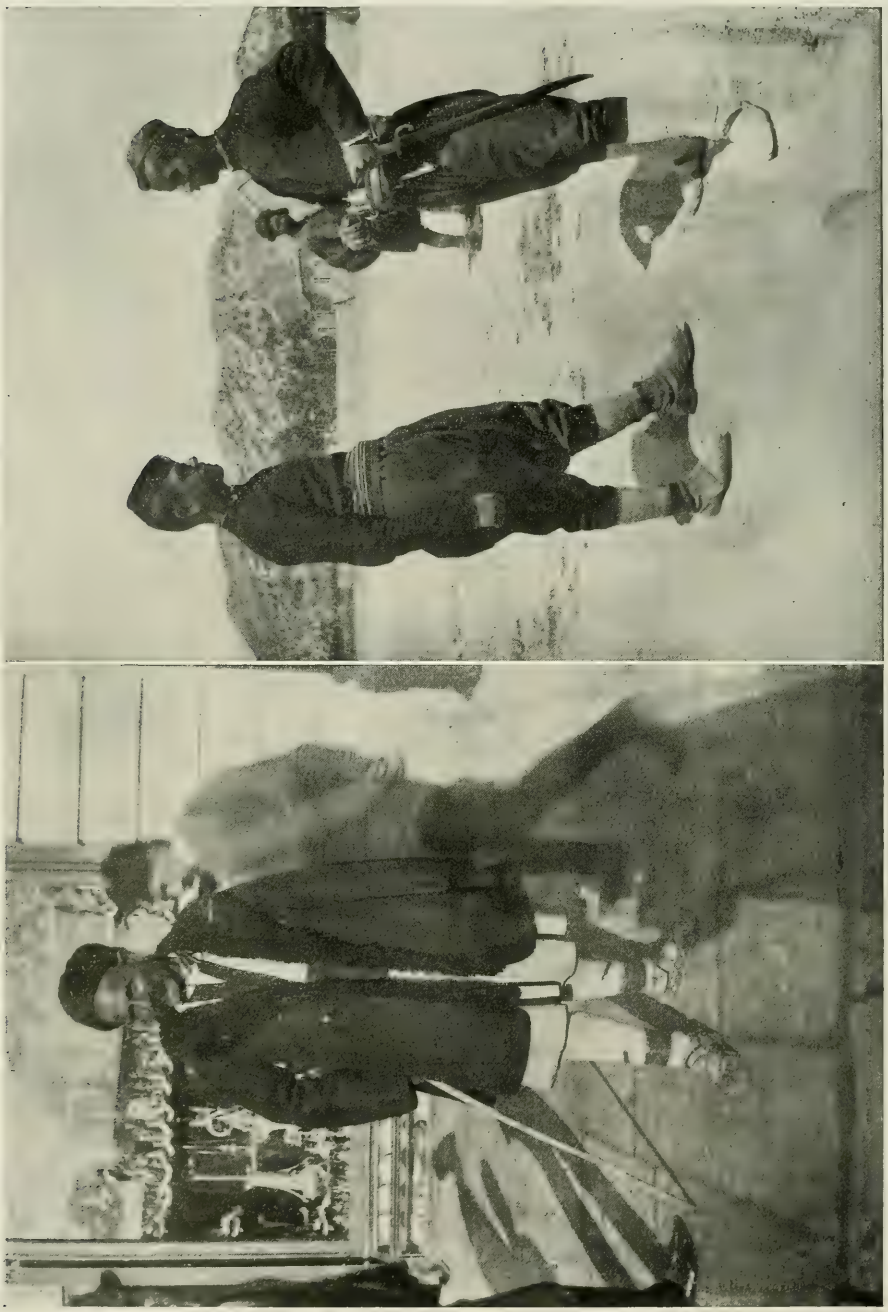
lin) was that the government should pay the Turkish landlords for their estates, which was done. The farms were then divided among the people. Servia has a population of about 2,600,000 and Montenegro about 250,000.

"Servia has been aptly christened 'The Poor Man's Paradise,' for we traveled from end to end of the country without encountering a single beggar, while the agricultural laborer seemed almost as affluent as a small farmer in England. But Servians have a prettier name for their native land, 'The Garden of the Balkans,' which it undoubtedly is, being the most picturesque and fertile of all the Balkan states. The farther you roam inland from the flat, marshy banks of the Danube the richer becomes the soil and more beautiful the scenery, although this is not, like Bosnia, a land of comfort and security. Here you must rough it, some-

Photo from "Through Savage Europe," by H. De Windt (Lippincott)

A PRINCE OF MONTENEGRO

There are only a few roads in Montenegro, and these were only recently constructed to connect the capital with the coast and principal villages. The Montenegrins did not desire roads because they feared by constructing them they would open the country to their enemies.



A SERVIAN: BELGRADE

Photos by F. J. Koch

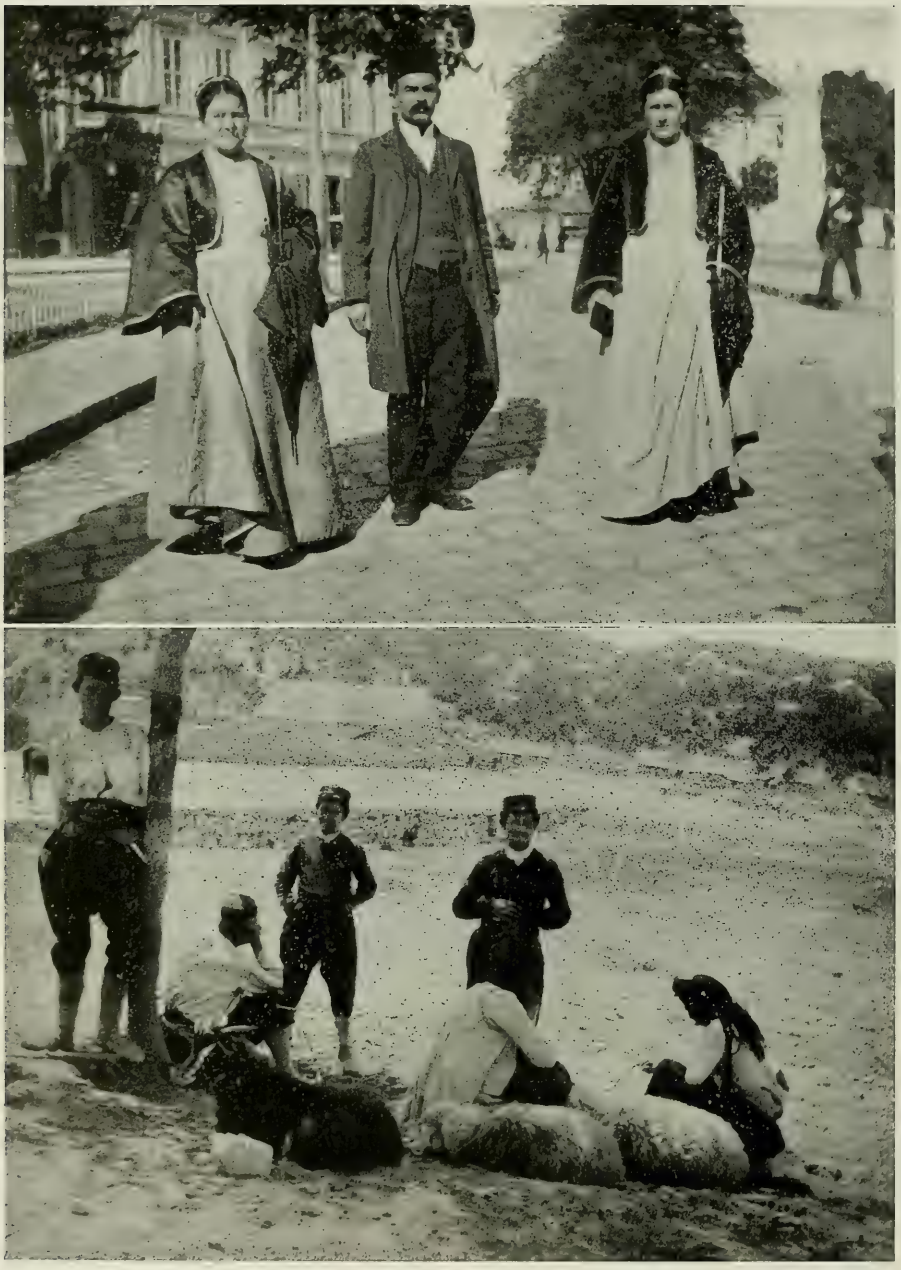
MONTENEGRIN SOLDIERS

THE TOWER OF SKULLS, NISCH, SERVIA

"The Tower of Skulls, for which Nisch is famous, is now a mere name for a column of bricks and clay about twelve feet high, where niches once occupied by the heads are the only traces left of this Turkish trophy, gruesome enough when seen by Lamartine, early in the last century. The sight was then a sickening one, for many of the skulls were furnished with hair and hundreds of grinning rows of teeth added to the horror of the spectacle. The story connected with the place is a romantic one, and goes to prove that Servian warriors of olden days were anything but the poltroons they are said to have become in modern warfare. One Stefan Sidielitch, commander of a brave little band, after stoutly defending an outpost near Nisch, was defeated by overwhelming odds, and sooner than surrender exploded the powder magazine, killing himself, his gallant followers, and an even greater number of the enemy. The Pasha, infuriated at the loss of his men, resolved to punish the Christian population by collecting the heads of their vanquished ones, and erecting this ghastly monument—now barely visible for the wreaths which have been placed on it. A few years ago a pretty chapel was erected over this spot by order of the late King Alexander, and the collection of grinning skulls which once formed the tower have now been burned."—H. DE WINDT in "The Balkan Trail."

times severely, away from the railway, and some of the country roads are not over-safe at night-time.

"Servia is an agricultural El Dorado, and if the untutored peasant can now make a living by antediluvian methods, what might not be accomplished with capital and machinery? I doubt whether there is at present a steam plough throughout the whole country, and yet I met at least half a dozen farmers at Kragujevatz with incomes ranging from 300 pounds to 500 pounds a year. Every season there are two crops of hay, wheat, and barley; while maize, oats, hemp, and tobacco grow like weeds. In pig-breeding alone there are millions to be made, and the rearing of horses and cattle on a large scale would be equally lucrative."—H. DE WINDT.



Photos by F. J. Koch

WELL-TO-DO CITIZENS OF BELGRADE, THE CAPITAL OF SERVIA

HERDERS AT CETTINGE, THE CAPITAL OF MONTENEGRO

MONTENEGRINS AT CETTINGE

Photos by F. J. Koch

SERVIAN WOMEN AT BELGRADE

Photos by F. J. Koch

Note the aprons which are embroidered by hand. The American shoe has not yet become popular in rural Servia

TURKISH WOMEN IN HERZEGOVINA

"Physically the Montenegrins are among the largest and finest people in Europe, and the conditions of their mountain life in a poor country have developed peculiarities that make them easily distinguishable from the Servians. They are a race of warriors, always ready to take arms against external encroachments, and equally ready to defend at home what they regard as their personal rights. They have thus the reputation of being excitable, quarrelsome, and violent, but every man, even the poorest, has the bearing and dignity of a gentleman. Theft is unknown, and drunkenness almost unheard of. A recent report from a town official said that the only persons who had been in the prison for a half year were five men who had told ghost stories which were prejudicial to public morality. Women are universally respected. A woman may go in safety anywhere in the country."*

* Consult article on Montenegro in "New International Cyclopedia," Vol. 12.

STREET SCENE IN SOUTHERN HERZEGOVINA Photo by F. J. Koch

The people of Bosnia and Herzegovina, the two provinces which have just been formally annexed by Austria-Hungary, after being governed by the latter country since 1878, are mostly Serbs. For descriptions of these provinces, see "Where East Meets West," by Miss M. E. Coffin, in the May, 1908, number, and "The Great Turk and His Lost Provinces," by William E. Curtis, in the February, 1903, number of the NATIONAL GEOGRAPHIC MAGAZINE.

Photo by F. J. Koch

SEARCHING EMPLOYEES AT A GOVERNMENT TOBACCO FACTORY, SARAJEVO, BOSNIA

WATER "FLASKS" FOR SALE AT MOSTAR, HERZEGOVINA

Each "flask" is a goatskin

Photo by F. J. Koch

Photo from "Through Savage Europe," by H. De Windt (Lippincott)

VEILED WOMEN OUT WALKING: MOSTAR, BOSNIA

A ROMAN BRIDGE AT MOSTAR, HERZEGOVINA Photos by F. J. Koch

A CORNER IN A MOSLEM CEMETERY: BOSNIA

The turban marks a man's grave; the other post a woman's

MERRYMAKERS IN BOSNIA

Photos by F. J. Koch

TURKS IN BOSNIA

A CITIZEN OF BOSNIA: A DERVISH, WHO IS A LABORER BY DAY AND WHIRLING DERVISH AT NIGHT

Photos by F. J. Koch

A TRAPPIST MONK: BOSNIA

Photo by F. J. Koch

A GREEK OF SALONIKI, EUROPEAN TURKEY

NOTES ON MACEDONIA

THE Christians of Macedonia for many years were called the most unhappy and unfortunate people of Europe. Though ruled by only one-fourth their number of Turks, they never combined against the Sultan, because they hated and despised each other more bitterly than their Mohammedan master. Bulgarians, Greeks, Servians, and Vlachs make up the principal Christian population. Until last summer the Greeks plotted to have the country annexed to Greece; the Bulgarians wanted Bulgarian domination; the Servians hoped that through Macedonia Servia might reach the sea, while the Vlachs believed that Rumania should in some way control the country.

The rivalry between the racial parties—they cannot be defined as races—worked death and disaster among the Macedonian peasants. Bulgarian and Greek bands committed upon communities of hostile politics atrocities less only in extent than the atrocities of the Turks, and they all supported the Turk against each other.

Now all has changed. Hatreds and

SELLING POMEGRANATES: SALONIKI Photos by F. J. Koch A WATER SELLER: SALONIKI

AN OLD TOWER OF SALONIKI

Photos by F. J. Koch

A STREET SCENE IN ADRIANOPLE, EUROPEAN TURKEY

CHRISTIAN WOMEN OF SALONIKI

VILLAGE SCENE IN MACEDONIA

Photos by F. J. Koch

Photo from "The Balkan Trail," by Frederick Moore (Macmillan)

GREEK ORTHODOX PRIESTS OF MONASTIR, MACEDONIA

jealousies, fed by five hundred years of bitter feuds, have been forgotten over night. Greeks and Bulgarians, Armenians and Turks, Jews, Christians and Mohammedans are publicly embracing each other. It seems that the leaders of the different Macedonian parties suddenly realized during the last year that their chance of liberty was hopeless so long as they fought each other. They agreed to try the experiment of uniting with the "Young Turks" of the empire, who had for a long time been plotting against the Sultan. The basis of the union was that all parties, irrespective of race or creed, should share alike in the constitution.

It was the Macedonians who took the lead in the recent revolution, and it is to them principally that the rest of the Ottoman Empire owes the opportunity of self-government now to be enjoyed.*

* An article on the Turkish Constitution will be published in the December number.

So great is their delight at having obtained a parliament and constitution that the populace have compelled Greek and Mohammedan priests to kiss each other on the town square.

The propagandas which have been conducted by the different parties for several generations have greatly benefited the people. The Bulgarian, Greek, Servian, and Rumanian schools—tolerated by the government because they divided the Macedonians—gave the peasants an education which they would not have acquired at the hands of the Turkish government. In the large centers the "gymnasiums" offer the inducements of higher education, and in some cases music and art, for which professors are brought from Budapest and Vienna. Children are often supplied with clothes, boarded, and lodged without charge.

Macedonia is noted for the picturesqueness and beauty of its scenery.

THE TURKISH BUTCHER: SALONIKI

"Over the backs of asses and sure-footed mountain ponies the butcher has an arrangement of carving boards, and cuts off a lamb chop or a roast at his customer's door. One has to rise early to see the heads still on the lambs, for they are great delicacies, and go first, and when roasted the unbounded joy of the native cracking the skull and picking out the tasty bits is nauseating in the extreme. The entrails of animals are also relished; they are eaten as the Italian eats his macaroni. The milkman, generally a Tzigane, does not drive the cow through the streets, but brings the milk slung over an ass, in a skin, one end of which he milks at order."—FREDERICK MOORE.

Many of its mountains reach 10,000 feet in height, and are clad with magnificent forests.

In ancient times Macedonia was one of the best-known regions of the world, but during many centuries of misrule the records of its early civilization have disappeared. The archeologist is sorely needed to recall the past, and would probably find rich relics of ancient grandeur throughout the province. Saloniki, the seaport of Macedonia, is said to be richer than any city in Greece in ecclesiastical remains, and its ancient structures, for the most part, have borne well the ravages of time. There are many great edifices, built by the Romans during their occupation and by the Greeks in their time, and a minaret at the corner of each denotes the purpose it serves today.

There is a mosque of Saint Sophia at Saloniki, built, like its great sister at Constantinople, during the reign of Justinian, and with a history also marked by the wars of the Catholic and Orthodox churches. But a fire of four years ago and an earthquake more recently have wrecked the place so that it is no longer used. The Rotunda, now the Eski Metropoli Mosque, was built by Trajan, after the model, though on a smaller scale, of the Pantheon at Rome, and was dedicated by him to the rites of the mys-

Photo from "Through Savage Europe," by H. De Windt (Lippincott)

THE MACEDONIAN

terious Cabiri. It is circular, the dome unsupported by columns. The whole of the interior is richly decorated with mosaics which seem to have belonged to the original temple, as nothing about them divulges adjustment at Christian hands.

Between the Rotunda and the sea is the site of the Hippodrome, where Theodosius, the last of the Emperors who were sole masters of the whole Roman Empire, caused to be committed one of the bloodiest of massacres for which Saloniki is famous. Although a zealous follower of Christianity, and commended by ancient writers as a prince blessed with every virtue, his moderation and clemency failed signally on this occasion. In order to chastise the people for a movement in favor of a charioteer very popular among them, and who had been arrested at his order, the inhabitants were assembled at the Hippodrome under the pretext of witnessing the races, and then barbarously massacred, without distinction of age or sex, to the number of seven thousand.

ALBANIA, THOUGH ALMOST IN SIGHT OF ITALY, IS THE LEAST KNOWN REGION OF EUROPE*

Albania is the most romantic country in Europe, probably in all the world. It is a lawless land where might makes right, and parts of it are as forbidding to the foreigner as darkest Africa. In some sections of the country the homes of men are strongholds built of stone, with no windows on the ground floors, and those above mere loopholes. At the corners of a village or estate are kulers, towers of defense, from which the enemy can be seen far down the road.

The first law of the land is the law of the gun, as it was in the wild west. But the country is more thickly populated than was the American border in the old days, and men have banded together in clans for offensive and defensive purposes.

There is no education in Albania—the Turks have kept the country illiterate—and promises have come to be bonds. It is because the Albanians keep their word that the Sultan at Constantinople has chosen them as his body-guard. But the Albanian has no regard for the man he has not sworn to, and, though the petty thief is despised, it is considered brave work to kill a man for his money.

Albanian customs are dangerous to break, and are handed down the genera-

* Abstracted from "The Balkan Trail."

Photo from "The Balkan Trail," by Frederick Moore (Macmillan)

ALBANIAN RECRUITS FOR THE SULTAN'S BODYGUARD

The Albanians were the only Christian race conquered by the Turks to change their faith and become Mohammedans. It was from their number that the Sultan picked his bodyguard. When they refused to obey his commands he realized it was time to grant the constitution.

Photo from "The Balkan Trail," by Frederick Moore (Macmillan)

MOHAMMEDAN WOMEN OF EUROPEAN TURKEY

The women of Macedonia, the Mohammedan as well as the Christian, took a leading part in the recent movement which resulted in the granting of a constitution by the Sultan. Many of the Mohammedan women are now refusing to wear the veil which has been so characteristic of their race for many centuries, and it is stated have been cheered by the populace, Turks as well as Christians, when they appeared in public dressed as their Christian sisters.

MAP OF SOUTHEASTERN EUROPE, SHOWING THE BALKAN STATES AND EUROPEAN TURKEY

MAKING TURKISH COFFEE

Photo from Henry C. Corson

A TYPICAL TURK

Photo from Henry C. Corson

ASIATIC SOLDIERS OF THE TURKISH ARMY IN MACEDONIA

tions unwritten as sacredly as are feuds. Some strange customs exist. To compliment an unmarried woman, for instance, is provocation for death. A bloody enemy is under amnesty while in the company of a woman. A woman may shoot a fiancé who breaks his betrothal or call upon the young man's father to kill him. If a man commits murder, and, flying for his life, enters the house of another, friend or foe, he is safe. This is the case, even if he takes refuge in the house of a brother of the man he has slain. He may not remain there forever; but for three days he can live on the best that the house provides. When that time is up, he is shown on his way. Twenty-four hours is given him to make his escape; after that the bessa is over and the blood feud begins.

In their national dress the Albanians of the north are always distinguishable. The men wear baggy trousers, usually white, tight fitting at the ankle. Down each side of them and over the back is a broad band of rich black silk cording. Very often a design in rich red tapers down each leg to the knee. A broad sash (over a leather belt), between trousers and shirt, serves as holster for pistol and yataghan. A short, richly worked waistcoat reaches down to the top of the sash, but misses meeting across the chest by six inches. The costumes differ considerably in various parts of Albania. In Southern Albania the men wear pleated ballet skirts like the Northern Greeks.

For headgear the Albanian generally wears a tiny, tight-fitting white skull-cap which looks in the sun like a bald spot. Some wear caps of Ottoman red, from which a rich, full, flowing silk tassel of black or dark blue falls to the shoulders.

The cut of the hair is peculiar. The men of one section will have their heads closely shaven, except in one circular space about an inch across. The single tuft curls down underneath the cap like a Red Indian's scalp-lock. Others will shave the top of the head where the cap rests. There is reason for this; as the Mohammedan seldom removes his fez, the heat over the head is thereby equalized. There are a dozen other cuts, none of which beautify the Albanian; nevertheless, he is always of striking appearance.

The Albanians are of pure European origin. They are tall, broad-shouldered men, with fine faces. They are quite unlike any of the other people of Macedonia, even speaking a totally different language. While nothing definite is known of their origin, it is more than probable that they are the descendants of the ancient Illyrians, who once occupied all the western side of the Balkan Peninsula, and were gradually driven to the mountains of Albania by the successive invasions of Greeks, Romans, Slavs, and Turks.

Albania has never been wholly subdued or civilized. It was partially conquered by Servian princes in the Middle Ages, and under them attained a certain civilization; but at the Turkish conquest it relapsed into a wild state.

The majority of the Albanians have become Mohammedans, chiefly because the religion carried with it the right to bear arms and other privileges.

THE OIL TREASURE OF MEXICO

By Russell Hastings Millward

American Vice-Consul at Tampico, Mexico

ON the Fourth of July last news was flashed to every civilized country that a second great oil gusher had been struck and was on fire at San Geronimo, Mexico; but little interest was taken in the item, beyond passing notice, until several weeks later, when experts reported that probably the largest oil well in existence had been discovered. Then it was that maps were searched in vain for San Geronimo, destined to become the center of the world's newest and greatest oil fields, the discovery of which has awakened the oil monopoly to a realization of the fact that the most dangerous opposition it has yet encountered must be met and seriously considered.

These fields are situated in the state of Vera Cruz and are most conveniently reached by boat from Tampico, a distance of 67 miles. Although no complete geological report has been made of this immediate vicinity, the district may be correctly classified in what is known as the Gulf Coastal Plain,* which extends from the Mississippi River westward through Louisiana and Texas, and along the coast of the Gulf of Mexico, through the Mexican states of Tamaulipas and Vera Cruz, and inward for a distance of from 50 to 75 miles. Bitumen or asphaltum had been found along the Gulf coast and floating about Lake Tamiahua for a number of years, and the natives, in a primitive manner, gathered the product and conveyed it by dug-out canoes to Tampico, where an excellent market was maintained. Encouraged by the seemingly inexhaustible supply, prospectors began to investigate the surrounding districts, and it is a matter of but a few years since the first important development work was started in the two adjoining states, and little more than a year since ground was broken at San Geronimo, with the result that the two gigantic wells, which are called Dos Bocas, have been found.

The first was struck at a depth of 2,000 feet and easily capped; but it was nearly a month later, while operating the drill at a depth of 1,800 feet, that the oil was unexpectedly encountered in the second instance in such quantities that it could not be controlled. Realizing the danger, the men ran to the boiler near by and endeavored to put out the fire before the inundation of oil reached the flame, but without avail, for the oil spread over the ground so quickly that it was immediately ignited and extended to the well, where the drilling machinery was destroyed. Within 24 hours several gangs of men were put to work in an effort to extinguish the mammoth pillar of flame which was to continue for nearly two months, fortunately without loss of life. Every effort was made to cap the well without success, and letters were received by the operating company, S. Pearson & Son, Limited, of London, from all quarters of the globe, offering advice and assistance of every conceivable description.

One man offered to extinguish the flame, bearing all the expenses in the operation, for a payment of ten days' flow of the well when under control. It is estimated that from 60,000 to 75,000 barrels of oil were consumed in flame each day from July 4 until August 30, when the fire was finally conquered, which loss, together with cost of development work and necessary expenditures, aggregated more than $3,000,000. During its fury the flame mounted to heights ranging from 800 to 1,400 feet, measuring 40 to 75 feet in width and presenting the most spectacular fire ever witnessed in the oil industry.

Newspapers could be clearly read at a distance of 17 miles, headlines at 33 miles, and ships' officers reported that

* See U. S. Geological Survey Bulletin No. 282, by N. M. Fenneman.

Photo from Russell Hastings Millward

MAMMOTH OIL GUSHER ON FIRE AT SAN GERONIMO, MEXICO

A sheet of flame measuring 1,100 feet high and 55 feet in diameter

the light was visible for more than 100 miles at sea. Many of the superstitious natives, believing that the world had come to an end, fled in mortal terror from the vicinity, and the Mexican authorities were alarmed to such an extent that several companies of troops were sent to assist in the work of extinguishing the fire. By the enormous pressure quantities of bitumen were thrown high into the air, and it was evident that the flow contained a large proportion of dry gas. The casings of 4 and 8-inch pipe were hurled from the well into the flame and rapidly converted into a twisted, molten mass by the terrific heat.

Every method of fighting fire known to the profession was adopted, but it was not until six centrifugal pumps were installed and sufficient mud and gravel forced around the gusher to concentrate a pack, restricting the fire and confining the oil to a limited area, that it was conquered.

After the fire was put out the flow continued as rapidly as before. Embankments were then heaped up to confine the oil until it could be disposed of. A lake of oil, nearly 1,000 feet in width, has already been formed.

Upon a recent examination it was found that the flow of oil had somewhat decreased, and that the well was making considerable salt water highly charged with sulphur. It is a general rule that such conditions indicate exhaustion, but it was determined later that the unfavorable elements were not present in sufficient quantities to cause any alarm, and that the flow is more uniform and without the intermittent pulsations. The conditions are such, however, that it will be impossible to arrange adequate tank storage of any kind for some time, and the oil continues to flow, spreading itself over a vast area. The company is now attempting to throw up encircling mounds or dikes of earth, forming an enormous reservoir, and in this novel manner hopes to recover a great part of the production.

NATIONAL GEOGRAPHIC SOCIETY

ANNUAL BANQUET

The attention of all members of the National Geographic Society is directed to the Annual Banquet of the Society, which will be held on Tuesday evening, December 15, at the New Willard, Washington, D. C. The Board of Managers have decided to make it a Navy evening. The Secretary of the Navy, Hon. Victor H. Metcalf, Admiral Robley D. Evans, who commanded the American fleet on the recent cruise from the Atlantic to the Pacific, and other naval officers and their wives will be among the guests of honor. Members of the Society journeyed from New York, Philadelphia, and other cities to attend the Society's banquet in December, 1907, and it is hoped that this year an even larger number of members living outside of Washington may be able to be present. There will be several brief toasts. As the number of persons who can be accommodated at the banquet is limited, members planning to come from a distance are urged to send in their reservations for plates at once. The price per plate is $5.00.

MEMBERS VISITING WASHINGTON

Members of the National Geographic Society visiting Washington are cordially invited to call at the Society's home, Hubbard Memorial Hall, Sixteenth and M streets. The Society maintains a considerable geographic library, and receives all the popular and scientific periodicals. The library is open from 9 a. m. to 4.30 p. m., except on Saturdays, when it closes at 12.

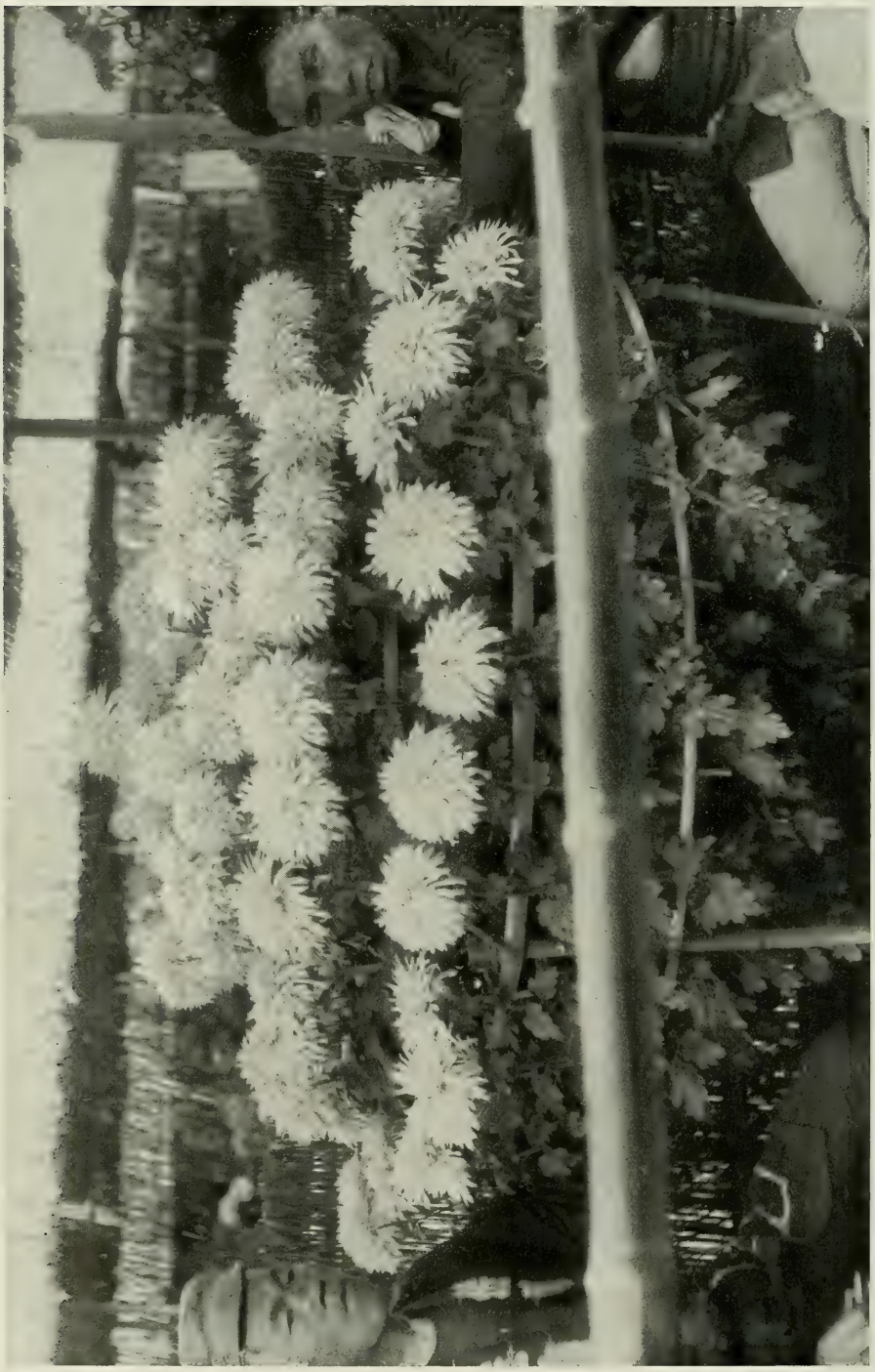
Members of the Society residing at a distance from Washington and who visit the Capital for a few days during the lecture season will be given complimentary cards to any address of the Society during their stay in the city.

PROGRAM OF MEETINGS

Practically all the addresses to the National Geographic Society during the season of 1908-1909 will be held in the auditorium of the Masonic Temple, Thirteenth street and New York avenue. Commencing with Friday, November 13, there will be an address in the auditorium every Friday evening at 8.15 until April 2, inclusive, excepting December 25, January 1, and March 5. The addresses will be published as far as possible in the Magazine of the Society.

One season ticket, admitting two persons to all the lectures, may be bought by each member for $3.00.

The completed program of meetings to be held in the Masonic Temple is as follows:



A SINGLE CHRYSANTHEMUM PLANT WITH 96 BLOSSOMS: JAPAN Photo from Rev. D. S. Spencer

Photo from Rev. D. S. Spencer

FIGURES OF MEN WITH CHRYSANTHEMUM PLANTS TRAINED TO GROW AS CLOTHING FOR THEIR PERSONS: ALL HISTORICAL CHARACTERS: JAPAN

November 7—"The Part of Africa where President Roosevelt will Probably Hunt," by Sir Henry H. Johnston, pioneer African Explorer. Illustrated.

November 13—"Fashion Plates from Afar," by Hon. O. P. Austin, Chief of the U. S. Bureau of Statistics. An account of the queer methods of dress and adornment employed by savage and civilized man from the Garden of Eden to the present day. Illustrated with lantern slides and moving pictures.

November 20—"Bulgaria and Her Neighbors," by Dr Hermann Schoenfeld, Professor of Germanics and Continental History, George Washington University, and Consul General of the Ottoman Empire in Washington.

November 27—"The Savage South Seas," by Mr Oliver Bainbridge, of England. Mr Bainbridge will describe the natives and ocean life in Fiji, the Bismarck Archipelago, Solomon Islands, Papua and Maoriland, a little known and romantic region. Illustrated.

December 4—"Through the Canyons of the Euphrates on a Raft of Skins," by Mr Ellsworth Huntington, of Yale University, author of "The Pulse of Asia," etc. The narrative of some interesting experiences and sights in the "Land of the Arabian Nights." Illustrated.

December 11—"The Redemption of Ireland," by Mr William E. Curtis. No longer does the Irishman in Ireland live on potatoes and peat. Illustrated.

December 18—"The Turkish Revolution," by Dr Howard S. Bliss, President Syrian Protestant College, Beirut. The democratic revolution in Turkey, which has thus far gained its ends without bloodshed, is one of the most remarkable and almost incredible movements of history. Dr Bliss since 1902 has been President of the great American University in Syria, of which his father, Dr Daniel Bliss, had been President for 36 years. Illustrated.

January 8—"A Digger's Work in Palestine," by Dr Frederick J. Bliss, author of "A Mound of Many Cities," "Excavations in Palestine," etc. Dr Bliss has been conducting important excavations in Palestine for 20 years. In one mound he found eight cities buried one under another. Illustrated.

January 15—"The Non-Christian Tribes of the Philippine Islands," by Dr Frederick Starr, of the University of Chicago. Who they are, how they live, and what the American people and government are doing for them. Illustrated.

January 22—"The Panama Canal and the Spanish Main," by Mrs Harriet Chalmers Adams, author of "Wonderful Sights in Andean Highlands," "Land of the Incas," etc., in the NATIONAL GEOGRAPHIC MAGAZINE. How 40,000 men are making the dirt fly at Panama; how they are cared for; their mess halls and amusements. With an excursion to the Spanish Main. Illustrated with lantern slides and moving pictures.

January 29—"Abraham Lincoln—Boy and Man," by Mr W. W. Ellsworth, of the Century Co. The year 1909 is the centenary of Lincoln's birth.

February 5—Major General A. W. Greely, U. S. Army, will address the National Geographic Society. The subject of this lecture will be announced later. Illustrated.

February 12—"The Bird Islands of Our Atlantic Coast," by Mr Frank M. Chapman, of the American Museum of Natural History. Illustrated with lantern slides and moving pictures of the pelicans and fish hawks.

February 19—"Java—The Garden of the East," by Mr Henry G. Bryant. Mr Bryant, like the majority of travelers, describes this island as "the most beautiful and fascinating region in the world." Illustrated with lantern slides and moving pictures.

February 26—"Aërial Locomotion," by Mr Wilbur Wright or Mr Orville Wright.

March 12—"The Hunting Fields of Central Africa," by Mr Gardiner F. Williams, author of "The Diamond Mines of South Africa," and for 20 years general manager of the De Beers diamond mines at Kimberley. Illustrated with lantern slides and moving pictures.

March 19—"Ruwenzori, the Snow Crowned Mountain of the Equator," by Prof. Edwin A. Fay, of the Tufts College, President American Alpine Club. This is the African peak which the Duke of the Abruzzi ascended two years ago. The magnificent photographs of the natives and scenery along the route taken by the famous Italian photographer, Sella, who accompanied the Italian prince, will be shown on lantern slides.

March 25—"Brittany—The Land of the Sardine," by Dr Hugh M. Smith, Deputy Commissioner of the U. S. Bureau of Fisheries. The industries and customs of this picturesque section of France will be interestingly described by one who knows them well. Illustrated.

April 2—"Homes for Millions—Reclaiming the Desert," by Mr C. J. Blanchard, of the U. S. Reclamation Service. Illustrated with lantern slides and moving pictures.

MEETINGS AT HUBBARD MEMORIAL HALL

In addition to the regular meetings held every Friday evening in the Masonic Temple, there will be occasional meetings of a more technical character in Hubbard Memorial Hall. Notices of these meetings will be published in the Washington newspapers. Postal announcements will also be sent to members asking for them. During December or January addresses are expected from Dr Albrecht Penck, Professor of Geography in the University of Berlin, Germany, and Kaiser Wilhelm Professor in Columbia University for 1909, and Prof. Raymond F. Beazley, author of "The Dawn of Modern Geography," of Oxford University.

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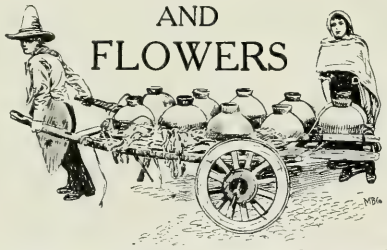

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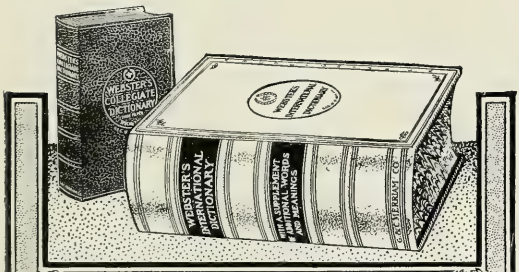

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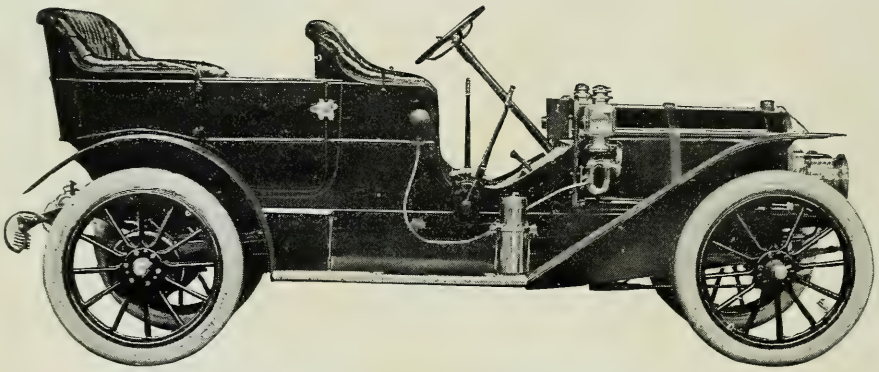

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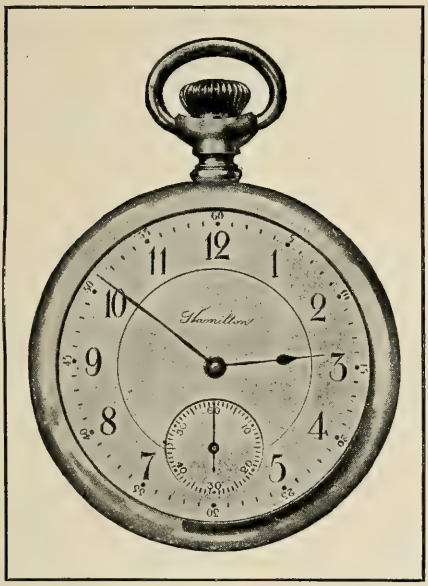

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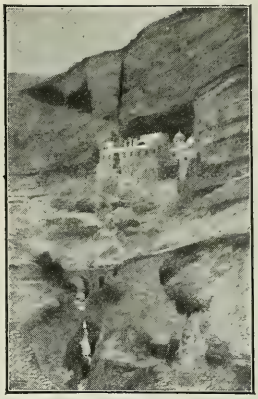

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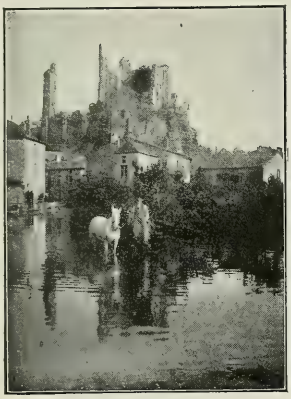

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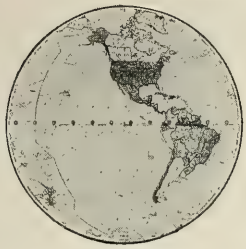

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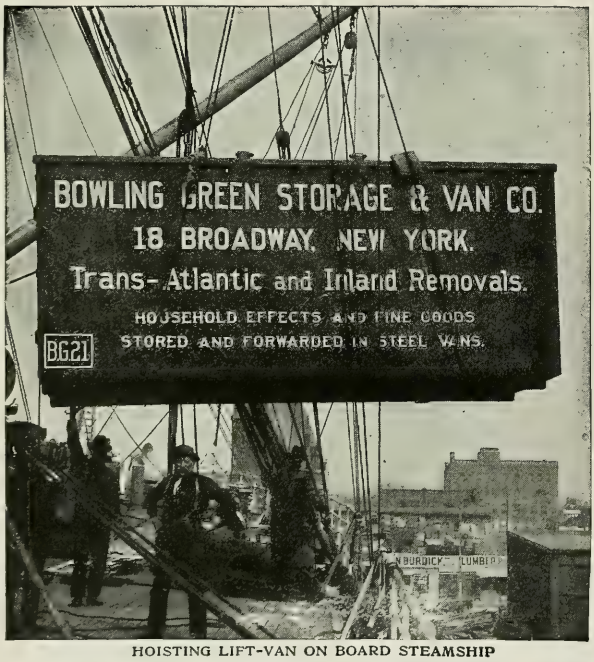
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THE NATIONAL GEOGRAPHIC MAGAZINE

IN QUAINT, CURIOUS CROATIA

By Felix J. Koch

With Photographs by the Author

"WHAT Hungary is to the Dual Empire, that is Croatia to Hungary," they had told us on the train as we whirled on into Agram. Agram, as you know, is capital of the crown land of Croatia. Croatia holds directly from the crown of Hungary.

What they meant was that even as Hungary is ever fomenting discord, preaching revolt, as it were, against the double crown, so in Croatia they are working for separation from Hungary, for Pan-Slavism—anything that will bring independence.

But we had come into Croatia primarily on a search for queer corners. Luck had favored us decidedly in bringing us into Agram on a Sunday morning.

On Sundays, in this part of Europe, the cities hold their markets. Not a bad idea, for then the husband can accompany his spouse to market and help bear the heavy basket.

Market time to a tourist, however, is the best of all times for viewing the native costumes of the peasants. In Croatia every village and hamlet has its particular costume. The costume varies for young men and old men, for matron and maid and dowager; but the same style has obtained for the same period of time since the days, perhaps, of Hunyadi. So one who knows the country-sides can tell at once the girl from Sissek from the vineyard lassie of Somobor, and she can tell you who has come from Ogulin, where the moss grows heavy on the roofs, and who makes her home beside the Plitvica lakes, the summer resort of all Croatia.

This market was the cleanest, fairest, and brightest of all markets whereof we know, and we have marketed from Hopedale, up in Labrador, to Saloniki, on the Ægean. The stalls were long benches, as some harvest home in Ohio. Long aisles ran between, and in these stood the peasants. The vegetables which they offered had been arrayed in neat piles or pyramids before them. Every apple was polished, every basket was immaculately clean. In Holland we found they cleaned things to bring the tourist; here, however, touristry was practically *nil*.

Yonder, as we sauntered, was some cheese on dainty plates of porcelain. Beside it was milk in a white jug, but with a brown mottling. Up above, over each stall, an immense canvas umbrella was raised, and that, too, was white. It made us think of the market at Strassburg.

BOUND FOR THE MARKET: AGRAM, CROATIA

A STALL IN THE MARKET OF AGRAM, CROATIA

SCENES IN THE MARKET OF AGRAM, CROATIA

PEASANTS AT AGRAM, CROATIA

PETTICOATS SEEN AT THE MARKET OF AGRAM, CROATIA

A CHURCH OF AGRAM

Thousands of peasants, men and women, surged by, selling and buying. The base of each of their costumes was white. A snowy white skirt, a white waist, a white head-scarf, that would be your final analysis. Then there was bead-work at the front of the waist, and again you might note the huge slippers. In the case of the men, on the other hand, there were white, loose trousers—something after the fashion of the bloomer of the Turk or of the Dutch boys of the Netherlands. A heavy belt, a loose white jacket, then a hat of brown or of black, and you had him analyzed. Every village had its modifications, and there must have been hundreds of varied costumes here. The entire market, as a result, was a great picture in daintiest colors. From five until eleven in the morning, one could see it. Civilians—that is, Agram folk—mingled to buy. People came, too, just to look on. But the costumes were in the great majority. It was the most beautiful market scene in Europe, the opportunity to "take" all types of Croat peasants. The sun shone to lure us; we had thirty-six snap-shots ere we knew it.

These people of Croatia seemed medium, or even small, of stature. They were tanned and good-natured. They had tomatoes and potatoes, eggs, apples, and beans, lemons and pickles, beets and

A PEASANT'S HOME IN CROATIA

A BARN IN CROATIA

FISHING FOLK ON THE ADRIATIC

oyster-plants. We group these as they had them here.

Above, the great white umbrellas cast a welcome shade. Booths of fruit—pears, peaches, and a tiny red fruit like a cranberry, but of the consistency of a plum—took the eye.

Then again one caught glimpses of men with cages on their backs, each cage well filled with chickens. A buyer, selecting his particular fowl, would clutch it by the neck to lift it and feel its weight. Meat, again, in another place, was hanging from a pole built onto a wagon stand, this wagon one of many in a row. The butchers, in civilian attire, had their places outside.

That, however, was just one section. In another some women, wearing white lace-work upon the head in default of scarf, again tempted the kodak. Again, a yellow silk kerchief was made to match a snowy white waist; a heavy braid then came out from a fold of scarlet. Aprons of white lace, too, were not few.

Surging through the streets and in between the stalls were other Croats. They were orderly; they did not push; there was plenty of breathing space. Again, unlike our American markets, there was no refuse on the streets. Soldiers mingled with the crowd, loitering sometimes over great crocks with red raspberries or about stalls with jelly. Several women of identical costume would always be found together—from the same village, of course; then beyond, where they sold the mangoes, another style could be seen. Here some had head scarfs of red, with a white floral pattern. That, too, gave color to the picture. Others wore a heavy white skirt, with an old-fashioned red and blue sampler of embroidery, suspended by two cords from the belt. Many had white or yellow beads of glass wound in chains several times around the neck and dangling down the waist. To the chain some church medallion or bits of ribbon might be hung. Ear-rings were in the ears, while in the hair glistening beadwork ornaments appeared. The richer would have a dense string of coral about the neck, and then on down the waist front.

We wondered why it was that in the Dual Empire people speak of "turbulent Croatia."

We sought out an editor here, and he outlined conditions. In politics today it seems the "ins" are the so-called "Government Party," who desire a more complete union between Croatia and Hungary. In fact, these would abolish the autonomy of Croatia altogether.

As a matter of fact, however, franchise is so tangled in Croatia that it is said but two per cent of the people really vote, and perhaps one-half of all these hold offices. Hence it is the "Official Party" which is in control with the Reichstag.

DRYING SARDINES, NEAR FIUME, CROATIA

We were told that the powers that be have pretty well curbed liberty in Croatia. Since 1895, it seems, in Croatia no one may form a literary or political organization without permit therefor. One needs to have a permit even to hold a political meeting, and this, with other parties than the reigning one, is withheld at pleasure.

Trades or labor unions likewise are under the ban.

Press censorship is exceedingly strict. Only a few weeks before the interview our editor friend had copied out of some Magyar paper an article anent a dispute between the King and a certain Herzog. The edition was confiscated at once for *lese mâjeste*.

In Croatia a paper appears, say, at 1.30 o'clock. Before it may be issued a copy is sent to the censor. If there be anything therein objectionable to the

MARASCHINO LEAVES: ZARA, DALMATIA, WHERE THE FAMOUS MARASCHINO CORDIAL IS MADE

ON THE MARKET: AGRAM, CROATIA

IN THE AUSTRO-HUNGARIAN PROVINCE OF DALMATIA

government, in perhaps a quarter of an hour the police will come and seize all the copies; the editor is also arrested or else must pay a heavy fine. With the populace, however, the editor becomes a hero; such imprisonment is not looked upon as a shame.

There are no newsboys in Croatia. Instead a subscriber comes to the office to get his copy or else it reaches him through the mail. Hence it is that the government can seize practically all copies of an edition within a short time after appearance. Often, moreover, it will be two or three days before the editor may know for just what article he was fined.

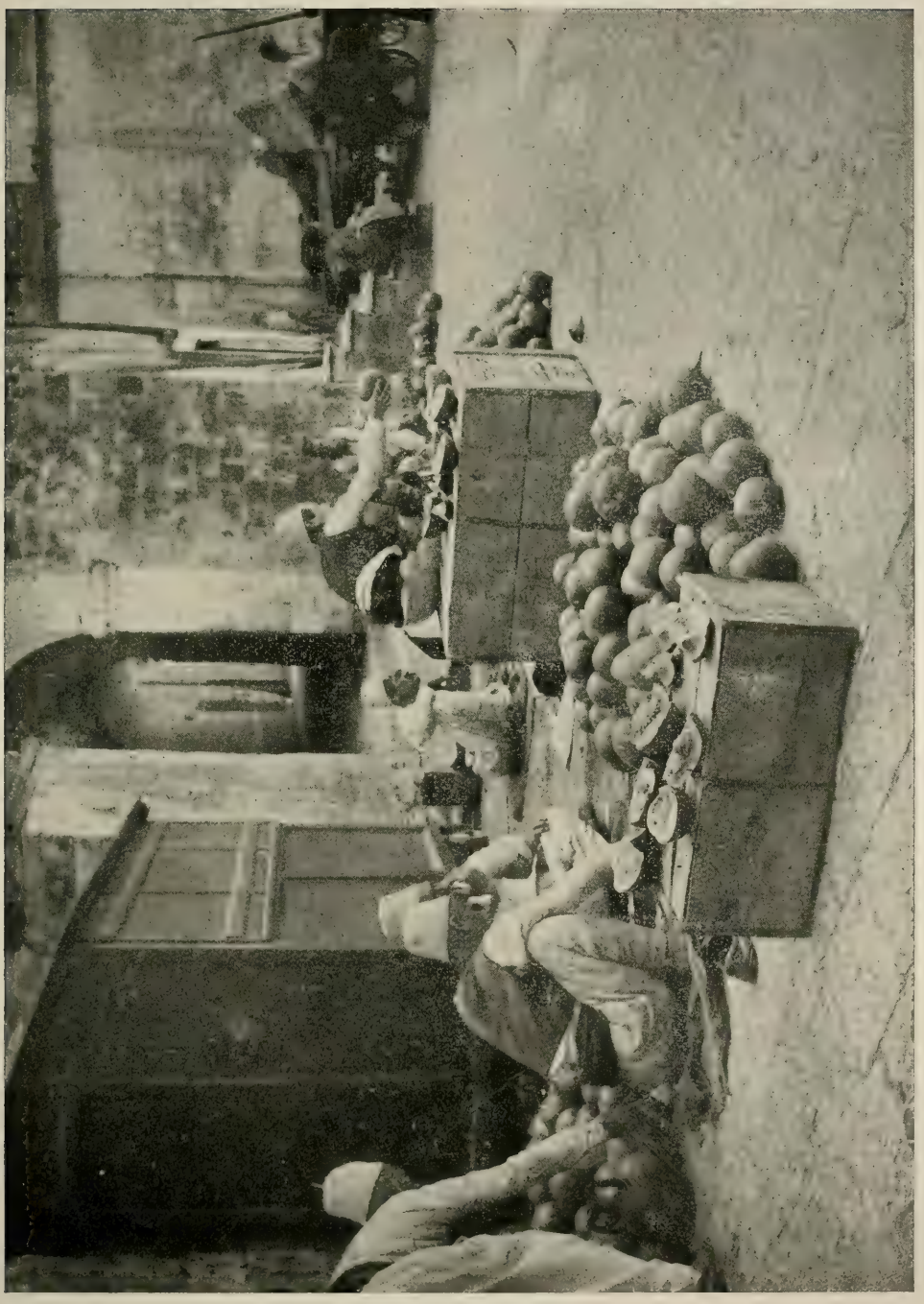
Again, the opposition papers do not get recognition from the government as journalists do. Hence they do not get passes on the government railways, are refused permits through the police lines in time of trouble, and have most strenuous times competing with their more-favored rivals. Strangely enough, in Croatia they are free to criticise the Hungarian government, but not that of Croatia itself.

A traveler in Croatia finds other things of even greater general interest.

Fiume, the great Magyar seaport, for example, while appearing on the map as nominally Croatian, is in fact a royal free city—one of the very few of the sort remaining in Europe. It holds direct from the Crown.

Fiume has an American interest, in that it is at this port that the tremendous hordes of immigrants from the southeast of Europe embark for America. Vessels especially built for immigrant service take these across at a minimum rate.

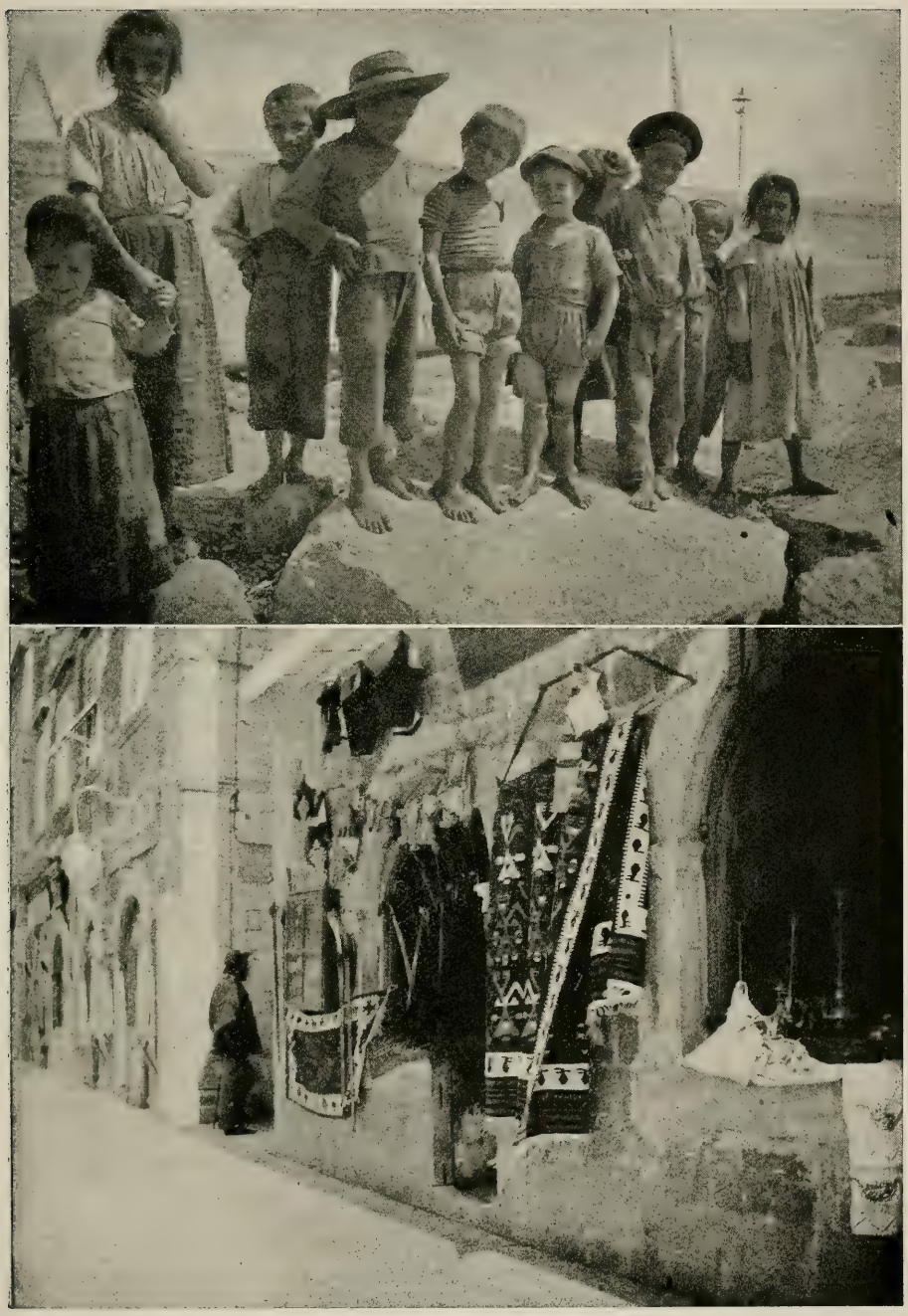
PERHAPS THE SMALLEST CAP ON EARTH. OFTEN A MERE DISC OF RED CLOTH THE SIZE OF A DOLLAR: IN DALMATIA



THE MELON MARKET IN SOUTHERN DALMATIA

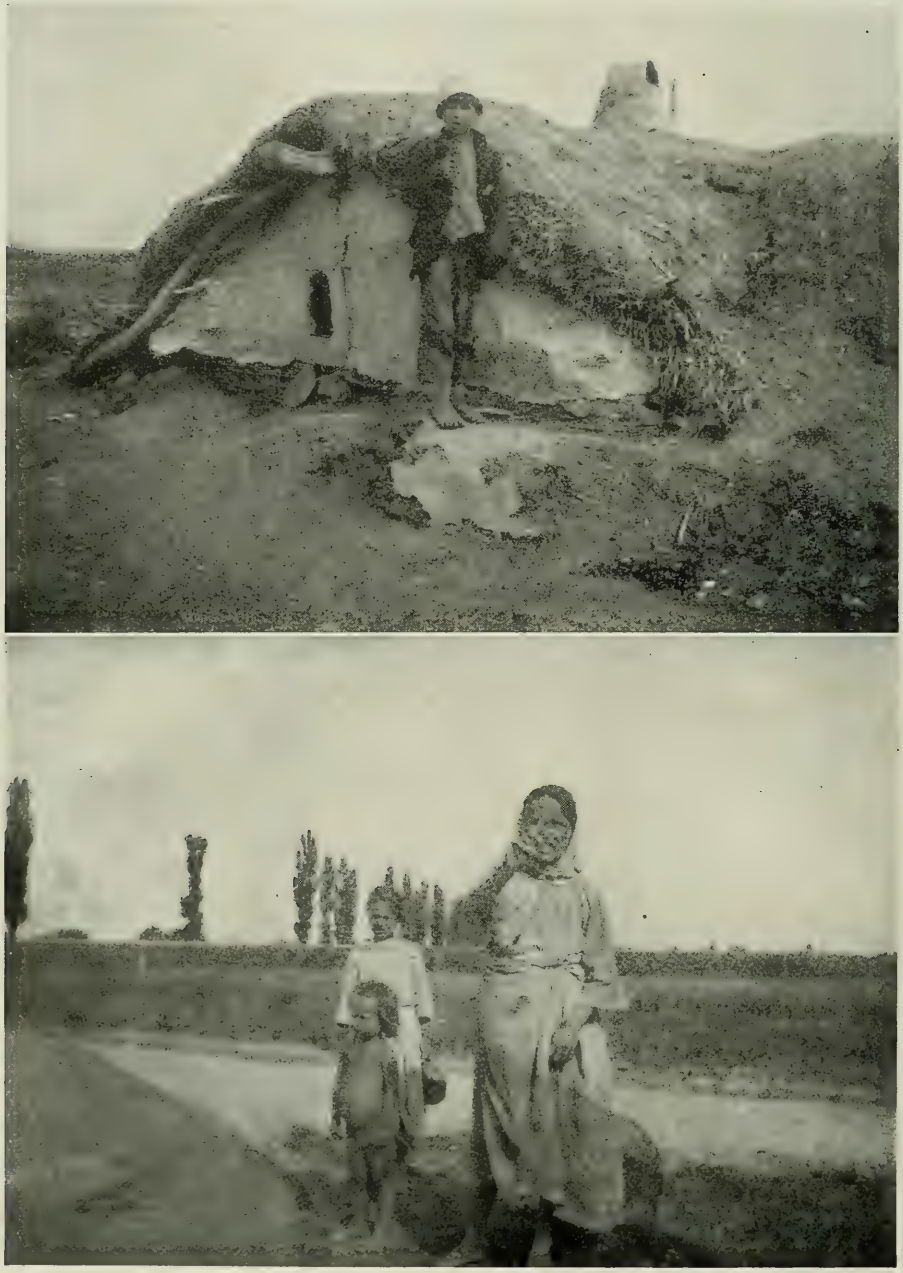
SCENE IN THE MACARONI FACTORY

A CHURCH PARADE FOR RAIN IN A DROUTH: ZARA, DALMATIA



THE HAZEL GATHERERS OF ROVIGNO. THESE NUTS ARE WORLD RENOWNED

A SHOP AT SPALATO. INSIDE DIOCLETIAN'S PALACE OF 305 A. D.



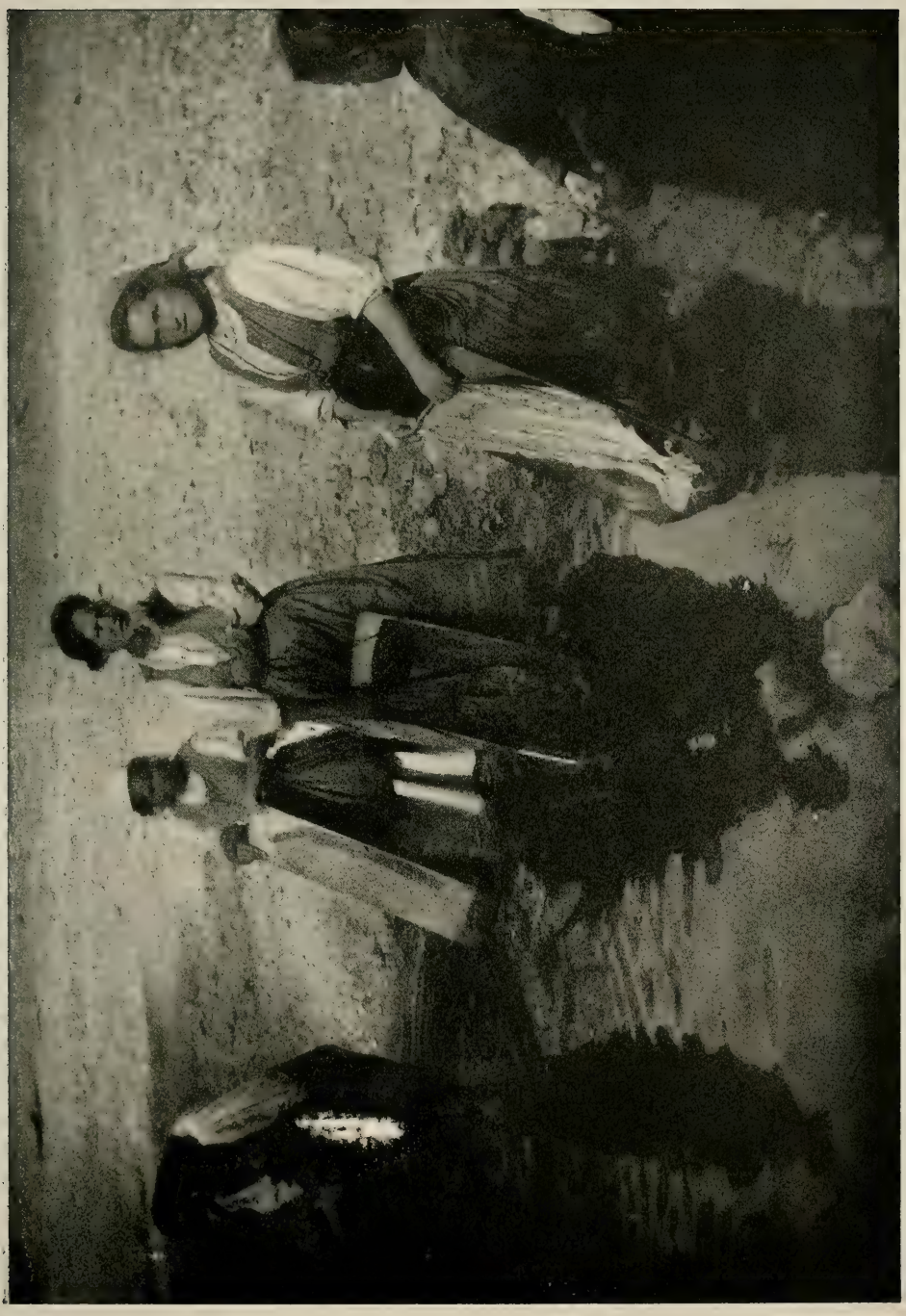
A GIPSY'S HUT AND FAMILY

INSIDE A GIPSY HUT. ONE STALL IS USED BY THE FAMILY, THE OTHER BY THE PIGS

GIPSY MEN

TREADING THE WASH, CROATIA

SLOVAK PEASANTS IN CROATIA



WASHING IN THE DOBRA: CROATIA

PEASANT BOYS: CROATIA

Ogulin is another point of interest. The little cottages here have all the charm of a cotter's life in Scotland.

It is cold, very cold, however, at Ogulin, in seasons when the *bora,* the cold northeast wind, blows, and so they have thatched the roofs thickly, and on the shingles the moss grows soft.

Quaint, old-fashioned gardens there are, too.

You remember the gay-colored balls of glass we used to see on our Christmas trees. In Croatia they mount these on poles, and then set them to the right and left of the walk. Here and there, too, among the flowers there are others of these balls.

Summer afternoons at four every one repairs to the garden. The men and the young girls come back from the fields, for here every one lives in town, working the fields outside. The mother will have the coffee brewed, and so they indulge in a bit of luncheon. The old grandfather pulls out a pipe curved of stem and with heavy porcelain bowl. The girls "take a hand" at the sampler and sew for an hour or so; then away to their several duties.

In the life of the Croat the patient ox very largely supplants the horse. Things are primitive, and so one has the town swimming-hole, where the youngsters bathe and the women come to wash their linen.

At Somobor there is another phase of life. Somobor stands among the vineyards — [illegible] they raise the grapes for the wine. In many parts of Croatia a glass of wine is far cheaper than drinking water. Drinking water, even in the city hotels, is served only when asked for.

Incidental to the grape industry, they have opened here a "grape cure." To this come those afflicted with a variety of ills. Then for your complaint you are

ON THE MARKET: POLA, CROATIA

advised to eat so many pounds a day of this sort of grape or perhaps of that and of the other.

Another feature of life here are the roads and the gipsies. What would Croatia be without these wanderers of the road sides? Long, steepling Lombardy poplars hedge in the thoroughfares, and one looks for miles down a tunnel of green.

Recently the government has sold the trees to the gipsies at something like two to three dollars apiece. They cut them for the timber. Again and again, on the roads, one meets the gipsies busy felling the trees or mayhap resting from their labors.

Both men and women braid the hair in little braidings, and as the raven locks fall on the coat it is hard to tell the sexes apart from behind. These are not the musical gipsies, but they are carpenters, smiths, and horse traders. Here today, yonder tomorrow, the Ishmael of today is the gipsy. But he is but one of many sidelights of life here in Croatia. It is interesting, this Crown land, turbulent though it may be. One wonders that to the tourist it remains still a well-nigh undiscovered country.

AT OGULIN, CROATIA

AT WORK IN THE SALT BEDS: CAPODISTRIA

SALTING IT DOWN BETWEEN THE LAGOONS: CAPODISTRIA, AUSTRIA

GOOD TYPES IN CROATIA

EMIGRANTS AT FIUME READY TO LEAVE FOR THE UNITED STATES

SOME RUINED CITIES OF ASIA MINOR*

By Ernest L. Harris

American Consul General to Smyrna

ON the top of Mount Pagus, which overlooks the bay and modern city of Smyrna, stand the ruins of a medieval castle. If it had never been destroyed it would probably be to-day as interesting a sight as the castle of Heidelberg or the Alhambra of Grenada. But only a few old walls are left, and even these are being rapidly torn to pieces in order to furnish the necessary paving material for the streets of Smyrna. In Germany everything is done to preserve or restore the old monumental castles which ornament the length and breadth of that country. In Turkey everything is done, on the contrary, to hasten and complete their ruin.

Mount Pagus has a history of its own. It has been the center of centuries of strife. Alexander the Great once spent a night upon its summit, and when he awoke in the morning he was so impressed by the natural beauty of the surrounding scene that he declared it was a situation worthy of a city. It is claimed that he induced the inhabitants of the ancient city across the bay to remove to the Pagus. King Lysimachus built an acropolis where the castle now stands, and upon the slopes of the hillside were grouped a stadium, theater, and other public buildings.

Smyrna then rose rapidly to affluence and power. It was one of the Asiatic cities which competed and won the permission to erect a temple in honor of Tiberius, the ruins of which have entirely disappeared.

Smyrna was one of the seven golden candlesticks of Asia, being the seat of one of the Seven Churches. Polycarp was martyred in the stadium in 155 A. D.

Apart from the disasters of war, the old city on the Pagus was often destroyed by earthquakes, but the Byzantine Greeks being hard pressed by the Turks, as often restored its fortifications and castle. Smyrna was always the center of conflict, because it could be strongly fortified and easily provisioned from the sea. It was the scene of terrific contests between Omar and the Knights of Rhodes. Then came the struggle of the Genoese and Venetians for commerce and trade, especially the former, who obtained treaties with Smyrna, Chios, and Phocia.

The Genoese influence and establishments were so numerous in this country 600 years ago, and the impression then created was so powerful, that even unto this day all the ruins scattered over the countryside are known by the name of Genoese. Ruins of Genoese castles are very numerous along the coast of the Levant and in the islands of the archipelago. In 1402 Tamerlane wrenched Mount Pagus from the Knights of Rhodes and built a wall with their skulls. When the Tartar chieftain retired the Turks again took possession, and with the exception of one short period thereafter, when the Venetians stormed the city and slaughtered the inhabitants, Mount Pagus and Smyrna have remained in the undisputed possession of the sultans. As the remains of antiquity have disappeared from Smyrna it has become a very interesting modern half Oriental, half European city.

The Yuruks, to whom I have referred several times, are nomads who wander over Asia Minor and have no special place where they remain for any great length of time. They speak Turkish and claim to be Moslems. They are always accompanied by their flocks and herds, which often consist of many thousand sheep, cattle, and camels. They are by no means poverty-stricken and are, as a rule, quite hospitable to the traveler when they are well paid. In traveling over Asia Minor, far from the seacoast

* Continued from the November, 1908, number.

cities and railway communications, the traveler often meets with the Yuruks, and to a certain extent must depend upon them for information and food. While visiting the ruins of Hierapolis, I became the guest, for an hour or so, of the Yuruks encamped at that ancient place. The Turkish coffee served was the best that I have ever had in this country. Cooked in a little brass pot imbedded among glowing embers of charcoal heaped in a large brazier, this coffee, served in tiny cups, produced a drink the palatableness and fragrance of which, upon similar occasions, has worthily called forth the admiration of such a great traveler as Bayard Taylor.

Asia Minor in some respects is a sportsman's paradise. In the months of December and January the coast districts of the vilayet of Smyrna abound in woodcock, and, strange to say, they seek shelter for the most part among the ruins of the ancient cities. Snipes are frequent among the marshes. In the month of September great flights of quail settle to rest in this part of the country, and more especially in the island of Mitylene, before they continue their way to Africa. During a visit to that island last autumn I saw thousands of quail brought into the market of the little town. They were all alive, and had been caught in nets at a certain place in a deep ravine near the coast, where they settle a few hours each year in their onward flight across the Mediterranean.

Ducks are very numerous. Near the ruins of Ephesus there is a vast marsh where thousands of them may be seen in the month of January. Nearly every other kind of water fowl are to be found in more or less numbers throughout the country. Partridges are also plentiful. This vilayet is noted for wild boar. The Meander plain is their home, but they often come as far as the suburban towns of Smyrna. The brown bear is said to be numerous in the interior of the country, and leopards are often shot among the hills not far from Smyrna. Hare is abundant everywhere. Wildcat, panther, mountain lion, and lynx are said to exist in some numbers in the interior. Deer are plentiful in the highlands, and fox hunting is good.

LESEOS, OR MITYLENE

Rising up like a huge promontory from the sea, the Island of Mitylene may be seen from far away. It is, and ever has been, one of the most prosperous islands of the Ægean Sea. It has an area of about forty miles in circumference, the surface of which is broken by two deep inlets. The mountain tops, among them the lofty Olympus, are covered with forest, and the little streams which flow through the deep valleys never go dry. It is an attractive island. The ancient Æolians termed it the pearl of their race, and Terpander and Sappho sang of its beauty in their lyrics no less than twenty-six centuries ago.

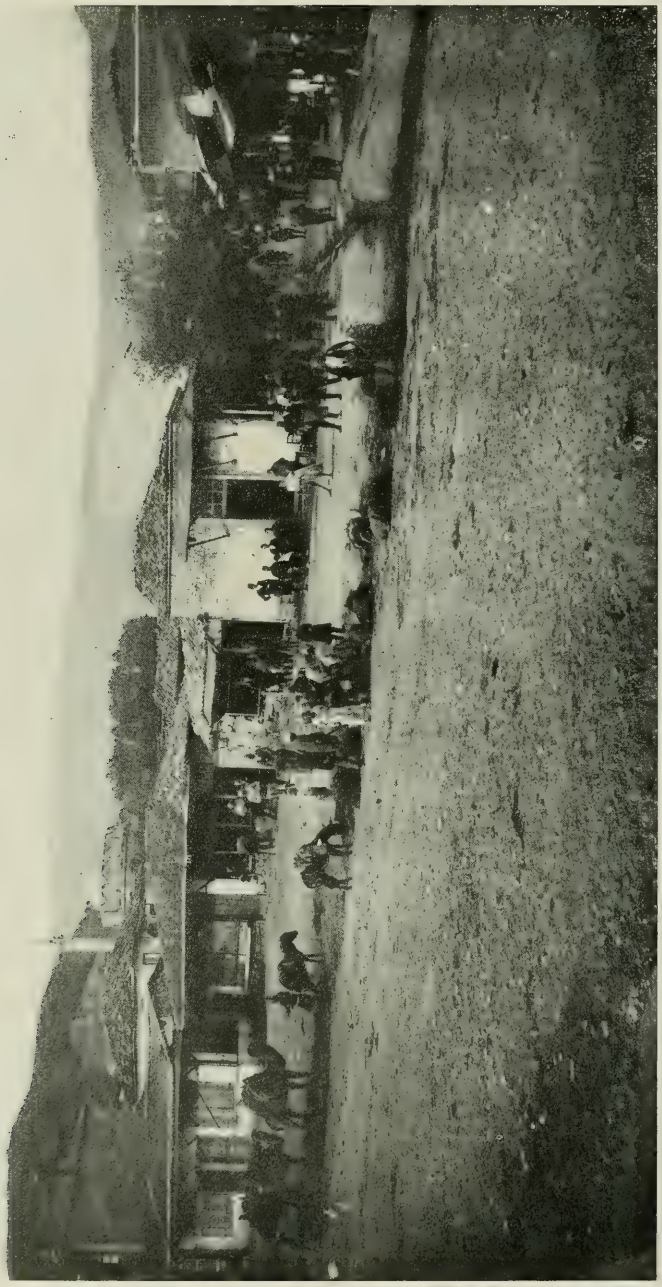
There are a few antique remains in Mitylene. Here and there traces of the walls of ancient Lesbos may be seen, as well as remnants of a theater. The castle of Mitylene is the finest monument of the middle ages to be found anywhere in the Orient. It is built upon the site of the old Lesbian acropolis, which at that time was disconnected from the mainland by a narrow sheet of water. This castle was built by the Genoese, and a visit to it will be rewarded by a splendid view of the town and harbor. At one time it must have been a strongly fortified position. Today it is the headquarters of a small Turkish garrison.

The writer visited Mitylene on two occasions in the summer of 1907, and spent in all about a fortnight there. One excursion was made to the entrance of the Bay of Hiera, and the other to the center of the island. In Roman times a huge aqueduct brought water from the base of Mount Olympus to Mitylene. Many of its arches may be seen not far from the town, and they give a good idea of the gigantic works executed by the ancients in this respect. There are several Genoese castles of note in different parts of the island, which tell the tale of the ascendancy of this seafaring people in the middle ages. Occasionally one stumbles

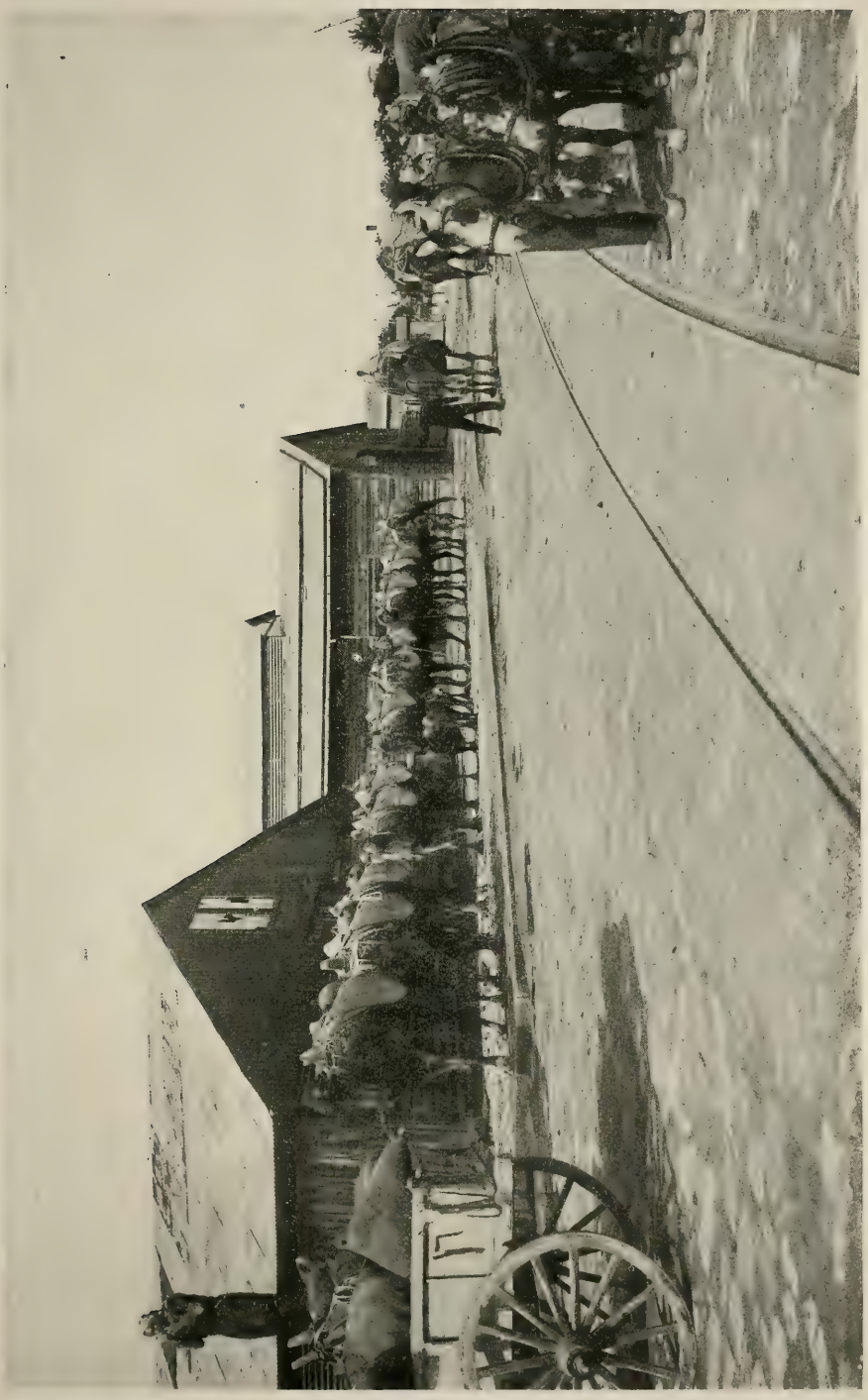
BIRDSEYE VIEW OF SOUTHERN PART OF PRIENE, SHOWING THE WINDING MEANDER IN THE PLAIN

This city has been completely excavated by the Germans (see page 857)

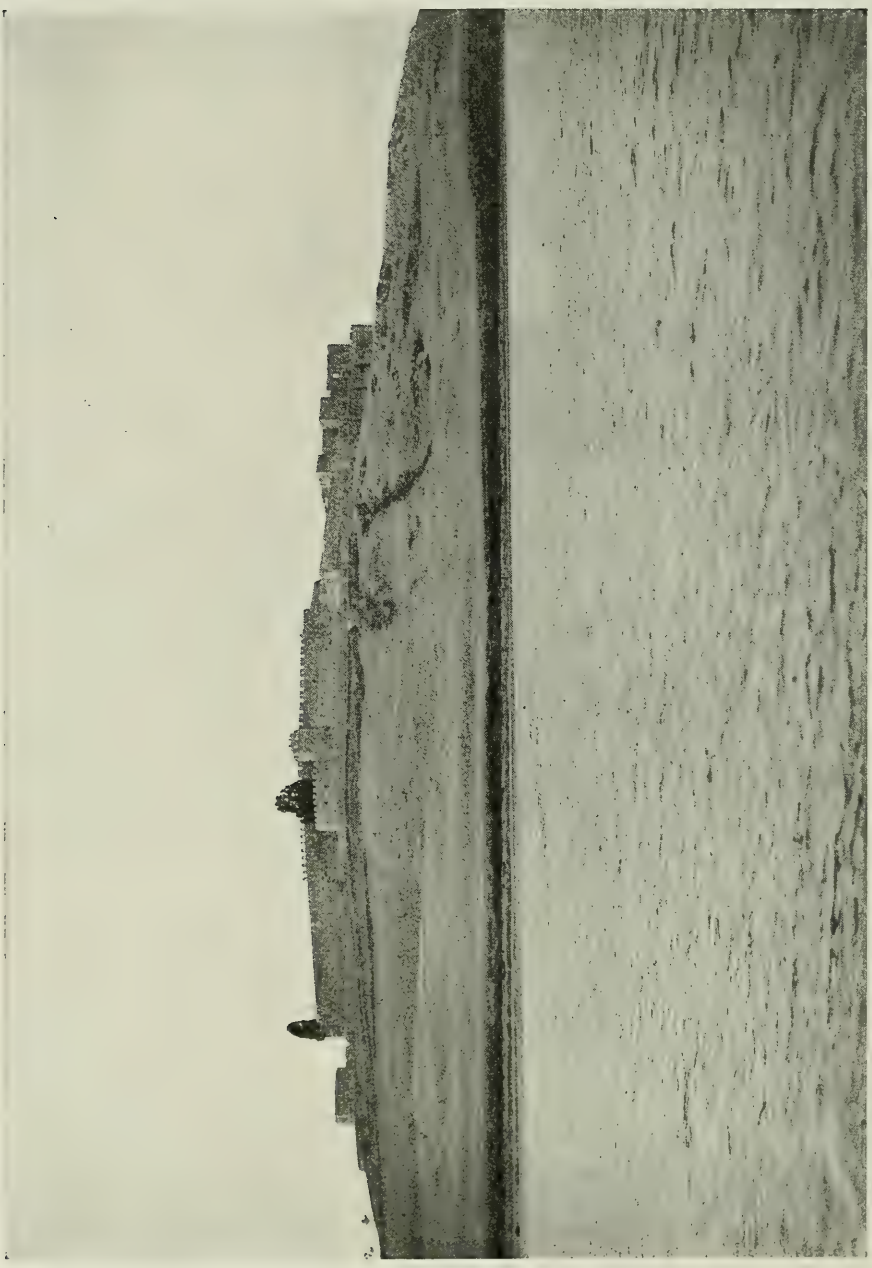
All the illustrations accompanying this article are from photographs by Consul Harris



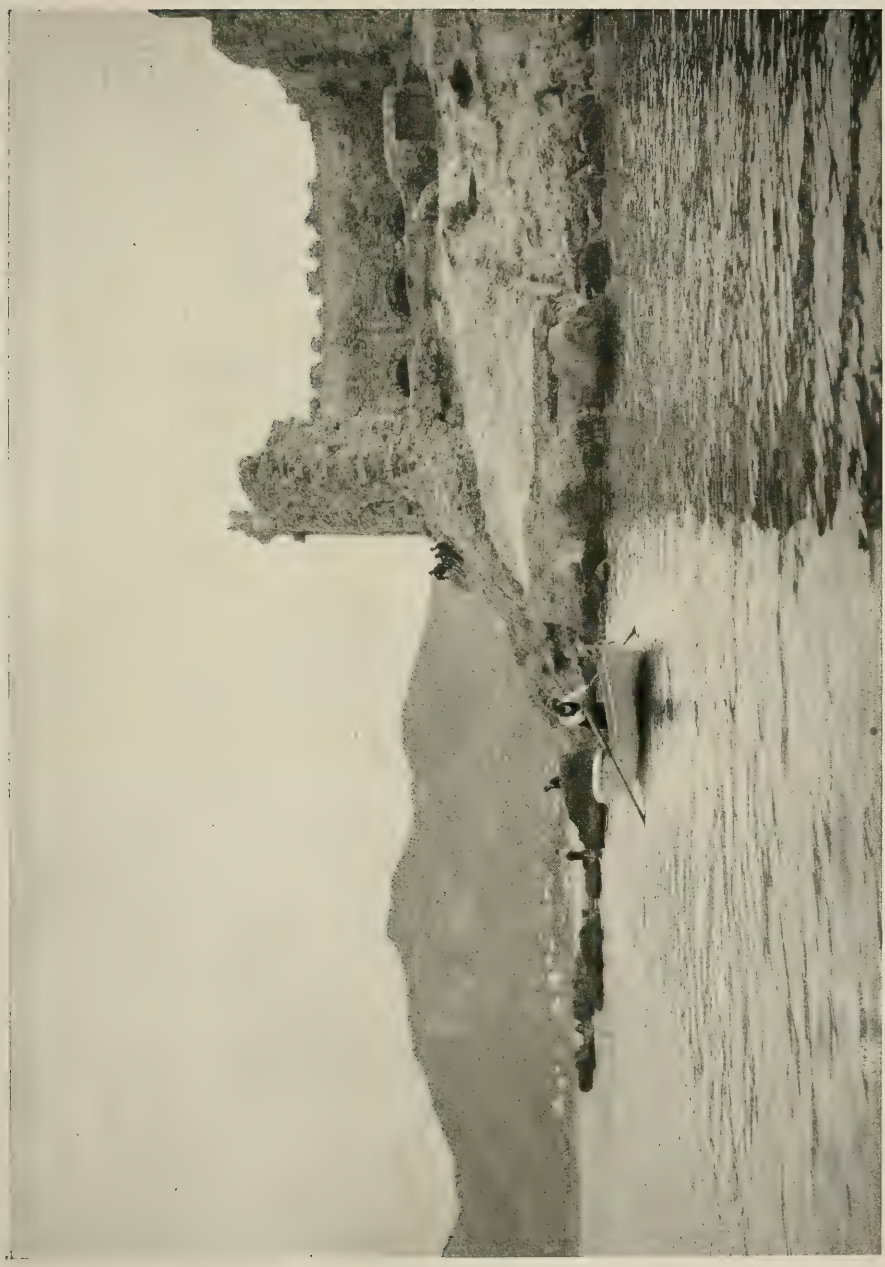
A TYPICAL TURKISH TOWN OF ASIA MINOR, NEAR SMYRNA



CAMEL DRIVERS UNLOADING CARGO AT A STATION, NEAR SMYRNA, ASIA MINOR



MITYLENE: THE OLD GENOESE CASTLE AS VIEWED FROM THE SOUTHERN HARBOR



MITYLENE: CASTLE MOLE AT THE ENTRANCE OF THE HARBOR

MITYLENE: PUBLIC ROAD THROUGH AN OLIVE ORCHARD

SCENE ON THE QUAY OF MITYLENE

SACK MENDERS AT WORK: SMYRNA

upon a ruin which dates from prehistoric times. But such are rare, and when they are found archæology is silent upon the story of their past.

Nothing but the hills and bays have remained the same as the Æolians knew them. That ancient race is gone, and many a one since then. But the island has remained the same. As Lesbos was, so is Mitylene today. The same, and yet how changed! Upon that shore the lyre of Sappho may be heard no more. She and her lover, and the Leucadian rock from whence she sought her death, are gone, and from that height today a monastery looks down upon the Ægean Sea. The island nation which lived to see a civic crown conferred on Cæsar, and to welcome Pompey as a fugitive, lives only now in name. Even the necropolis, to which they all were borne, has disappeared.

Modern Mitylene is very fertile, and produces all the fruits native to these regions. The chief wealth of the island is the olive tree. The forests provide timber and pitch for the small but prosperous boat-building industry, which gives a livelihood to many of the inhabitants. Farming is only done on a small scale, for the reason that there is but little arable land. The roads are good—much better, in fact, than on the mainland—and are kept in a good state of repair. The people are honest, sober, and industrious.

As coins and inscriptions of rare antiquity are often found in various parts of the island, it is thought by those in a position to know that excavations properly conducted would bring to light monuments and relics of great value.

EPHESUS

Of the twelve Ionian cities which once thrived at various places along the western coast of Asia Minor, Ephesus was different than the rest, inasmuch as it

WASHING FOR GOLD: ASIA MINOR

was the only one, with the exception, perhaps, of Myus, which did not have a protected harbor near the open sea. Although today the Mediterranean has receded some considerable distance from Ephesus, yet in ancient times a canal led from an inner artificial harbor to the River Cayster, and from thence to the sea.

The old landmarks in and around this famous city stand today just as they stood when the Temple of Diana, one of the Seven Wonders of the World, shone forth in all its splendor, and the general outlines of the hills and plains are probably pretty much the same as they always have been since creation's dawn. When viewed from the railway station of Ayasalouk, the twin mountains of Prion and Lepre, with the dark ridge of Coressus in the background, present exactly the same picture, with perhaps the exception of some forestry, more or less, as the one beheld by the various peoples who have dwelt here or passed this way in every epoch of the world's history.

To the archæologist, historian, traveler, and last, but not least, the theologian, Ephesus offers splendid opportunities for study. Attic and Asiatic culture, Pagan, Christian, and Mohammedan religions, Ionic and Doric architecture have thrived here practically side by side.

During the past two hundred years the

EPHESUS: EXCAVATED STREET LEADING TO THE LIBRARY

On either side may be seen broken pillars of unknown buildings. Upon these pillars are inscriptions which indicate that they formed a part of some much older building in another part of Ephesus

EPHESUS: THE DOUBLE CHURCH, WESTERN SECTION

vast wilderness of ruins which mark the site of ancient Ephesus has contributed much to human knowledge, especially architecture. From 1864 to 1871 Mr J. T. Wood, after a long search, finally succeeded in discovering and excavating the Temple of Diana. Since that time others have obtained permission to dig, and especially the Austrian government, which is at present successfully engaged in excavating the double church, library, and other interesting buildings.

Today the site of the Temple of Diana, or Artemision, is nothing but a huge hole in the earth partly filled with water, which usually dries up in the summer time, but on account of the swamps all about, it is considered to be a hotbed of fever. Remnants of broken pillars and blocks of marble which served as a firm basis for the temple may be seen projecting above the water. In 1870 Mr J. T. Wood, after searching for seven years, discovered the whereabouts of the temple and made this excavation. The destruction of Diana's marvel has been exceptionally thorough. Throughout hundreds of years it was used as a marble quarry for adorning the mosques and public buildings of Constantinople and Ayasalouk.

The temple at Ephesus was one of the most remarkable structures ever reared by man. As an example of what an inexhaustible mine of treasure and relics the site of Ephesus is, I have but to state that in 1904 Mr Hogarth, an English archæologist, succeeded in making some new discoveries of note upon the site of the temple. Mr Wood, in his statement, says that he went to such depth that he found the original charcoal which was placed in layers upon the natural soil as a foundation for the temple. Mr Hogarth put up steam suction pumps in order to keep the shaft clear of water, and, piercing through this layer of charcoal, succeeded in finding the pavements of two former temples. At some considerable distance under the altar he unearthed a large stone box filled with gold coins and ivory figures dating from the time of Solomon.

The theater at Ephesus was one of the largest in Asia Minor, and had a seating capacity of 24,500 persons. It has been entirely excavated, and one may distinctly see sixty-six rows of seats one above the other. The proscenium stands today in ruins, although enough still remains preserved to give a good idea of its magnificent proportions. Handsome shafts of polished granite and marble pillars adorn the front entrance. It was in this theater that Saint Paul's preaching aroused the fanaticism of the smiths and craftsmen who made a living from the manufacture of little portable shrines or models of the Temple of Diana.

The ruins of Ephesus are so vast that it is practically impossible for anybody to adequately describe them, and while many monuments have been fully studied, yet I am not aware that anybody has ever thoroughly covered or explained the identity or history of all that is extant above the earth's surface.

What is most needed at Ephesus is a systematic excavation of the entire city, upon the same basis and thoroughness as has characterized the work of the Germans at Priene.

Ephesus was one of the twelve Ionian cities, and later became the seat of one of the Seven Churches. As the terminal point of one of the greatest highways leading into the interior of the country, the city soon rose to commercial opulence. It was the home of Heraclitus, who exerted such a powerful influence upon the earlier Grecian philosophy. It was from Ephesus that Mithridates issued that famous decree which doomed to massacre no less than one hundred and fifty thousand helpless Roman men, women, and children. The Roman emperors, with the exception perhaps of Nero, who caused the temple to be plundered, following the example of Alexander the Great, did a great deal for Ephesus in the way of rebuilding the city after earthquakes, building embankments for the Cayster, and in dredging the inner harbor. In 260 A. D. the Goths destroyed the city and temple.

Under Seljuk and Byzantine rule Ephesus gradually declined and became

deserted. The real cause of this decline, however, is probably due to the choking up of the harbor and the rise of Smyrna and Constantinople, rather than the many wars which raged about the city on land or sea. In the third and fourth centuries, however, before her decline, Ephesus attained a degree of considerable prosperity and retained a certain ascendancy in church affairs, as is shown by the fact that no less than six councils were held here. For some time during the early middle ages, Ephesus and Miletus, farther down the coast, continued to rival each other as a gateway to the commerce of the interior districts.

EPHESUS IS WITHIN EASY REACH OF THE TRAVELER

Ephesus is about forty-eight miles distant from Smyrna, and can be reached from this city in three hours. The trains are so arranged that the visitor who wished to view the ruins may have about four hours at his disposal. Anybody who takes advantage of this opportunity carries away impressions which last for a lifetime.

Yet very few people who visit Smyrna ever go to Ephesus. Only the other day (February 20, 1908) a German tourist steamer, with two hundred and fifty passengers, stopped a day in the harbor, and nobody went to Ephesus. The *Arabic,* coming from New York, calls for a day at this port every spring, and only a limited number of tourists ever go to see Ephesus. I am inclined to think that this is due to both ignorance and indifference.

Ephesus is the only ruined city in Asia Minor of any importance which may be easily and comfortably reached. I know by experience that the others can only be visited after hours, or even days, of horseback riding from the nearest railway station, at considerable expense, hardships, and constant danger from brigands. In many districts the government flatly refuses to permit the traveler to go, even when guarded by mounted police.

It therefore seems a sin for any one to come to this interesting port without taking advantage of the opportunity of seeing the only really accessible and one of the most important of the ruined ancient cities which abound in Asia Minor.

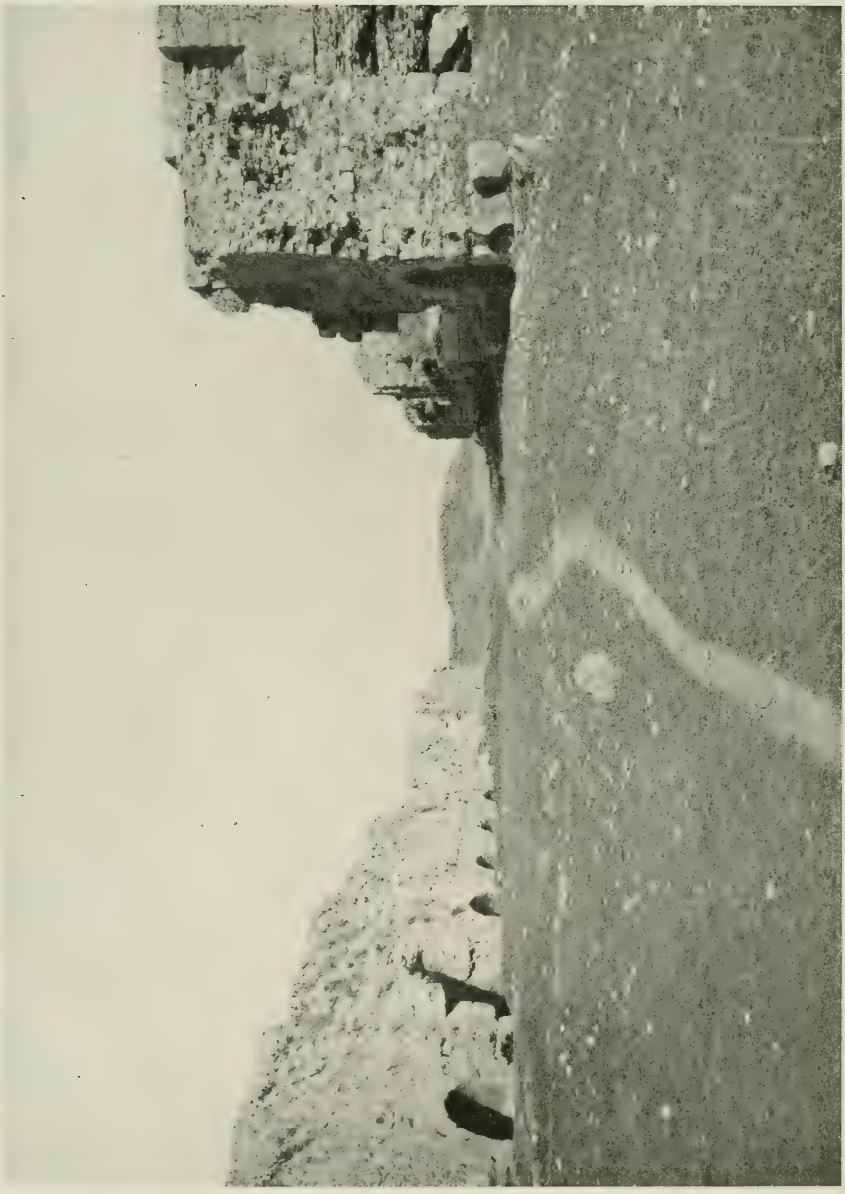
MAGNESIA

At one time Magnesia must have surpassed in magnificence and splendor all the other towns of Ionia, Lydia, and Phrygia, for the simple reason that the Persian Satrap for many years gave this city the preference as his residence. Such, at least, is the opinion of many, and an inspection of the ruins certainly give this impression. The city was built near the base of Mount Thorax, and the walls may still be distinctly traced almost the entire way around the site. The ruins of all the public buildings show that a snow-white marble was used, the quarries of which existed in Mount Pactyas, the same source, it is claimed, which supplied the Ephesians with the necessary material for many of their monumental structures.

A band of some fifty gipsies have squatted among the ruins, and they earn a living by weaving baskets. At least the women earn the living, while the men spend the day in smoking cigarettes and drinking coffee. The straw huts of these people are not only filthy in the extreme, but they are also the haunts of every kind of vermin. From one of the foremost cities in Asia Minor to a wretched gipsy village is a steep descent, and the contrast is complete. Of Magnesia, as of Babylon, the denunciation is fulfilled:

"I shall make it a possession for the bittern; and pools of water. . . . The cormorant and the bittern shall possess it; the owl also and the raven shall dwell in it; and he shall stretch out upon it the line of confusion and the stones of emptiness."

As if to prove to me how literally this is true, as I approached the gymnasium in the plain a startled owl rose up from the "stones of emptiness" and took refuge in a deep crack in the wall. Pools, too, have taken possession of the ancient site, and the winding Lethæus seeks its way over broken pillars and marble fragments



STREET IN MAGNESIA: ROMAN BARRACKS ON EITHER SIDE

among places where the reed and cat-tail grow to the near Mæander.

Unlike Ephesus, Hierapolis, and Laodicea, Magnesia is not a place where one cares long to tarry by the way. There hangs over the spot a spell which is fraught with desolation, and fever lingers in the nooks of ruin. And yet there once was life in that inanimate mass, wherein culture, art, and learning sat enthroned. If these scattered heaps could but tell their stories, and fill up the gap of centuries! Sad havoc time has with that city made, and the intervening years since last it was the abode of man have cast over it a cloud of gloom and mystery.

The peasants, Turk and Greek alike, shun the site with superstitious dread, for from that quagmire ghost-like phantoms rise at midnight and hover about the temple. Such, at least, are the stories told by the country people, and as they are an exceedingly superstitious lot, it is easy to account for their fears concerning the ruins of Magnesia. And even the stranger is glad when he has turned his back forever upon this scene of desolation. Only the gipsy seems to thrive near it.

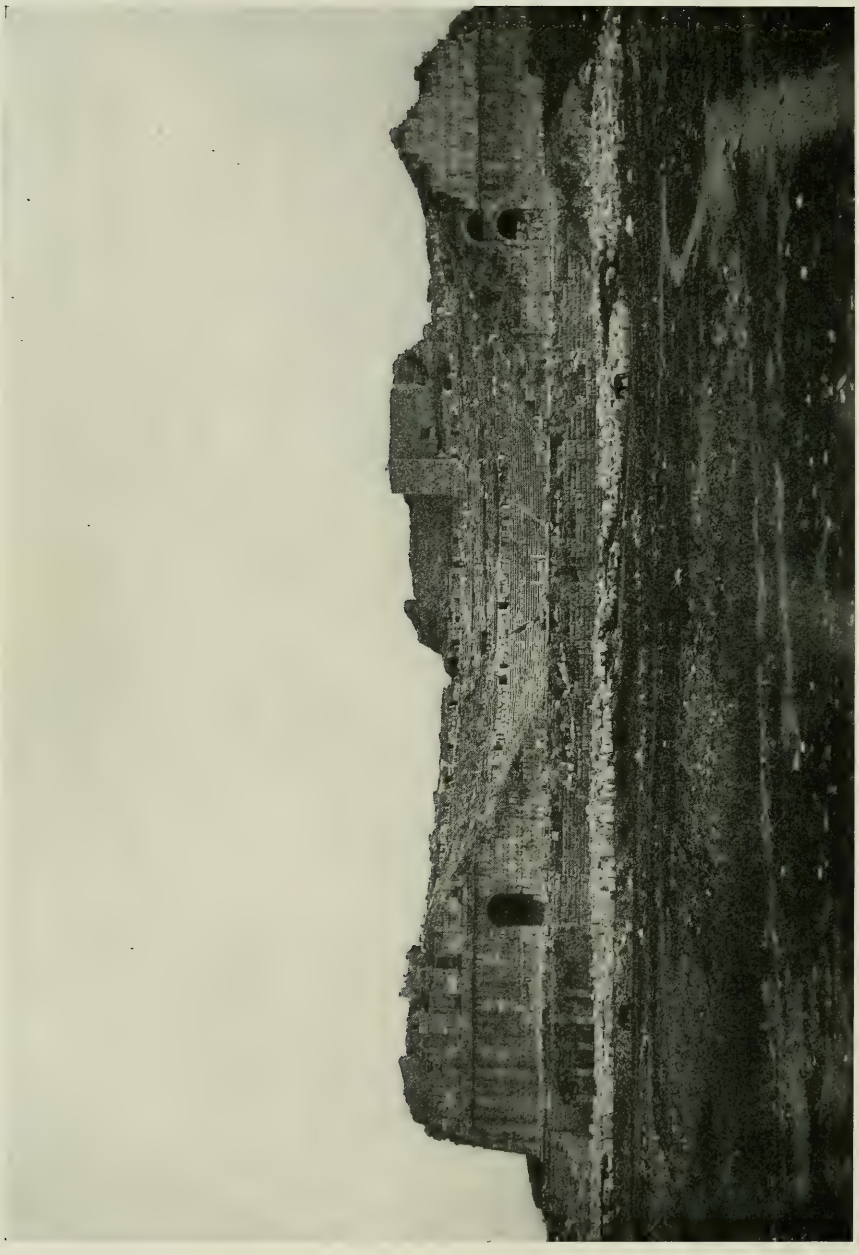
MILETUS

Ancient Miletus stood at the point where the River Mæander flowed into the sea, and, like Ephesus and Smyrna, it formed one of the chief gateways of communication between Greece and Rome with the interior of Asia Minor. So favorable was the situation of the city and such the genius and energy of the people that the commerce of Miletus soon extended to remote regions; even in the earliest days of Ionian history the navigators of this town, in quest of trade, sought the Euxine Sea, the Propontis, Egypt, and the confines of Greece and Italy.

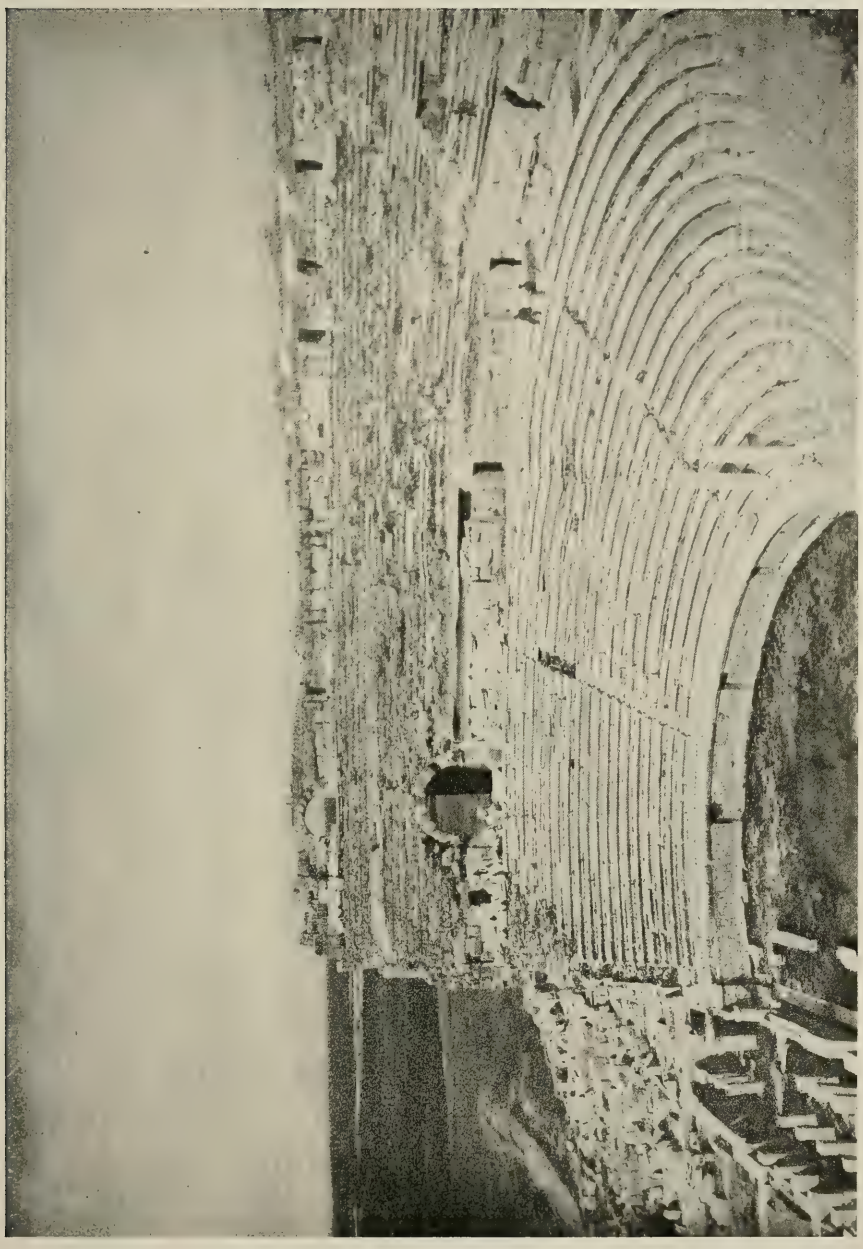
Merchants and travelers from abroad were in turn eager to visit its shores and enjoy the splendid hospitality of its citizens. It became celebrated for luxury, art, and learning, and there grew up within its precincts a great school of historians and philosophers. Its sons were renowned in war, and as the head of the Ionian Union it bore the brunt of the onslaughts of Darius and Alexander. The women were noted for their beauty and wit. The fame of its theater and temples were proverbial in the ancient world.

One of the finest sights in the whole of Asia Minor is the gigantic theater of Miletus. Those who admire the Coliseum at Rome should go to Miletus and see its equal. Unquestionably nothing like it in the shape of a theater exists anywhere else in the world. The length of the stage alone is 140 meters (459.31 feet) and the upper semicircle of seats is no less than one-half a kilometer (1640.41 feet) in semi-circumference. Immense staircases ascend up through the entrances of the wings and sides, while huge arched corridors lead to the stage, pit, and upper galleries. We have before us here one of the grandest heritages of antiquity. The storms of war which have burst and spent themselves upon this theater during the past two thousand five hundred years have have left it scarred and weather-beaten, to be sure, yet only the more solemn and imposing on that account.

In Miletus philosophic thought and culture first took root, and the Ionian school, if I may so term it, maintained an intellectual supremacy over the world at large for a period of more than one thousand years. The dominating philosophy of the ancient world was the Grecian, to which the Ionian cities contributed an important part. It began in the sixth century B. C. and ended in the sixth century A. D. It had its birth in the same period as the ascendancy of the Persian Empire, and its last school ceased to exist with the downfall of the western Roman Empire. A peculiar fate decreed that some of the first Grecian philosophers were compelled to flee from Persian persecution when the storm clouds began to gather about the Ionian cities, and after the lapse of a thousand years the last of the philosophers of Greece were forced to seek refuge with the Persian kings after an edict of a Christian emperor evicted them from Athens.

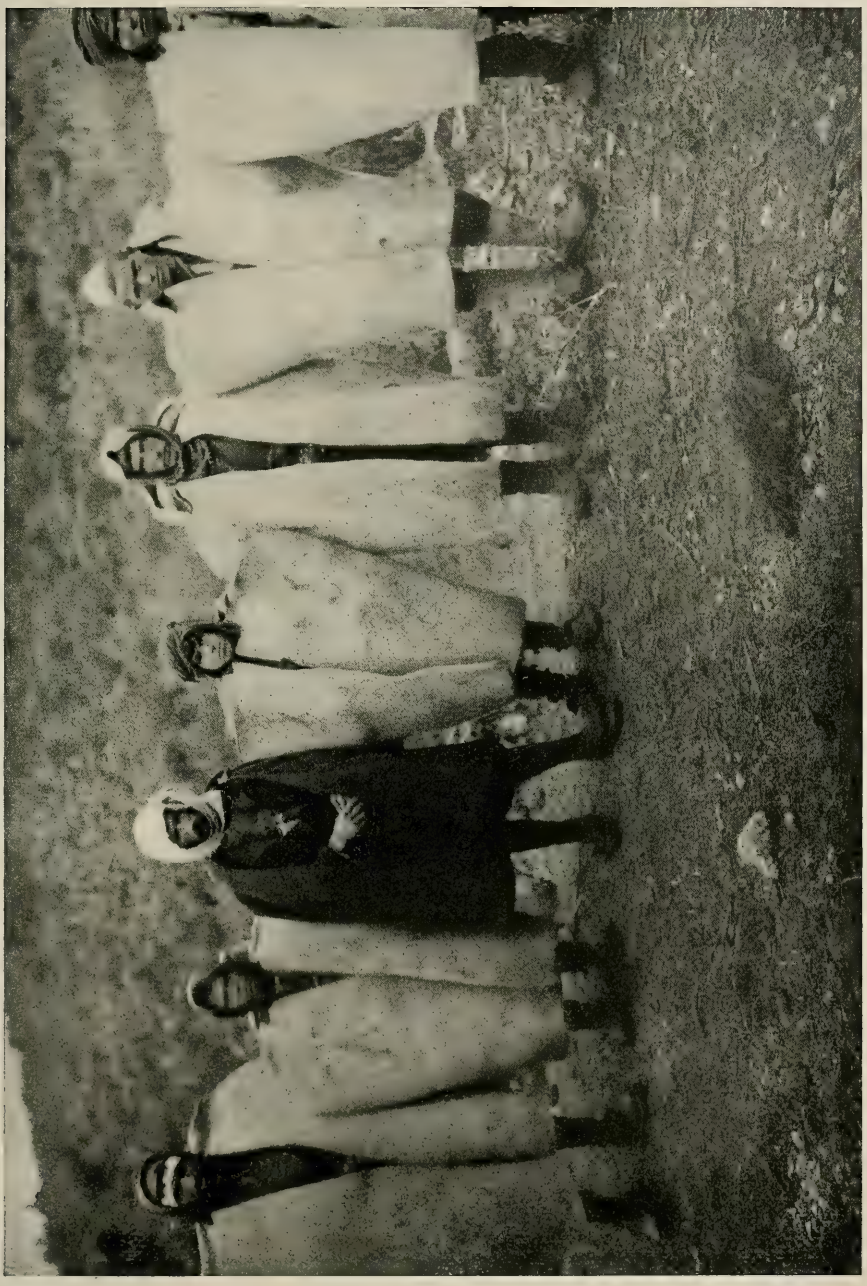


THE GREAT THEATER AT MILETUS, BELIEVED BY MANY TO BE THE EQUAL OF THE COLISEUM AT ROME
(SEE PAGE 849)

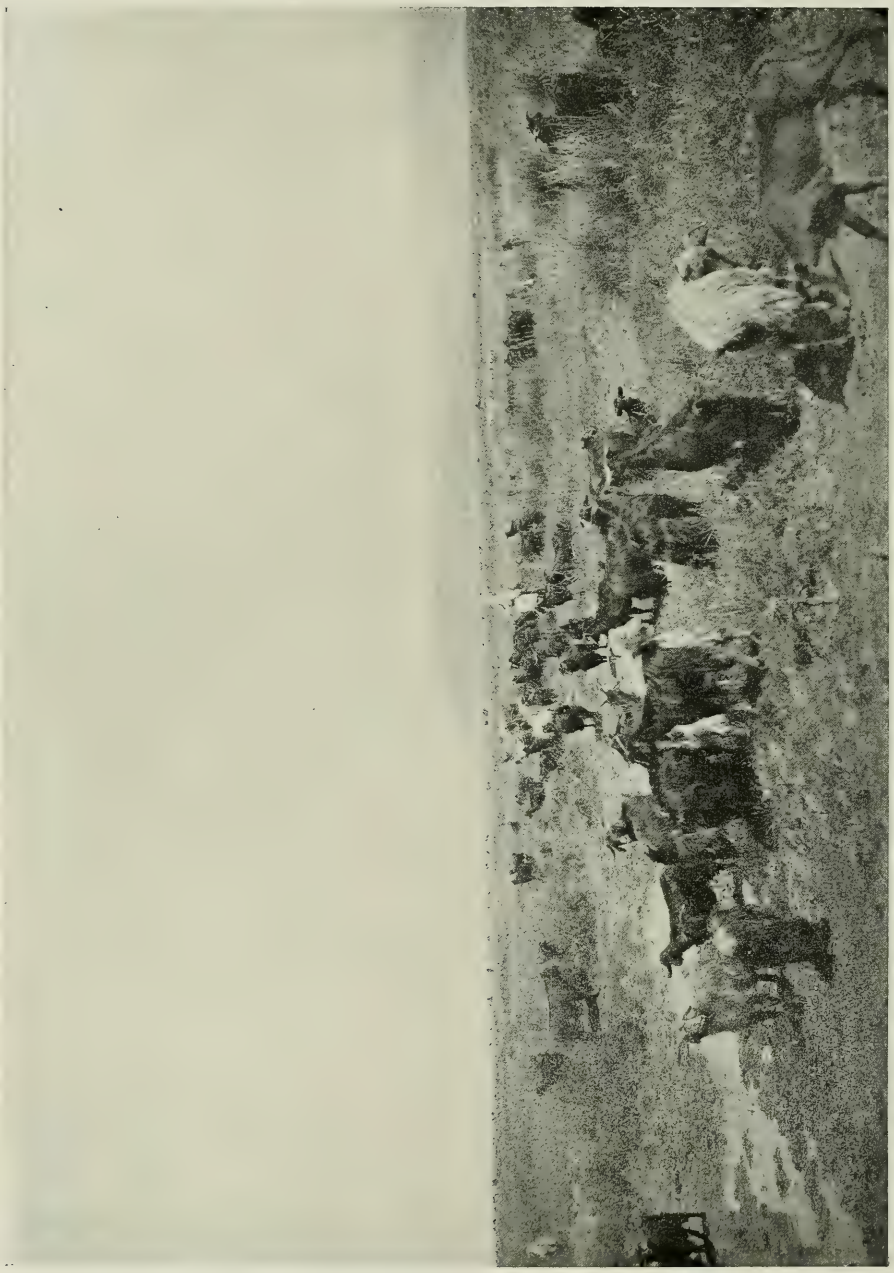


ONE END OF THE THEATER AT MILETUS

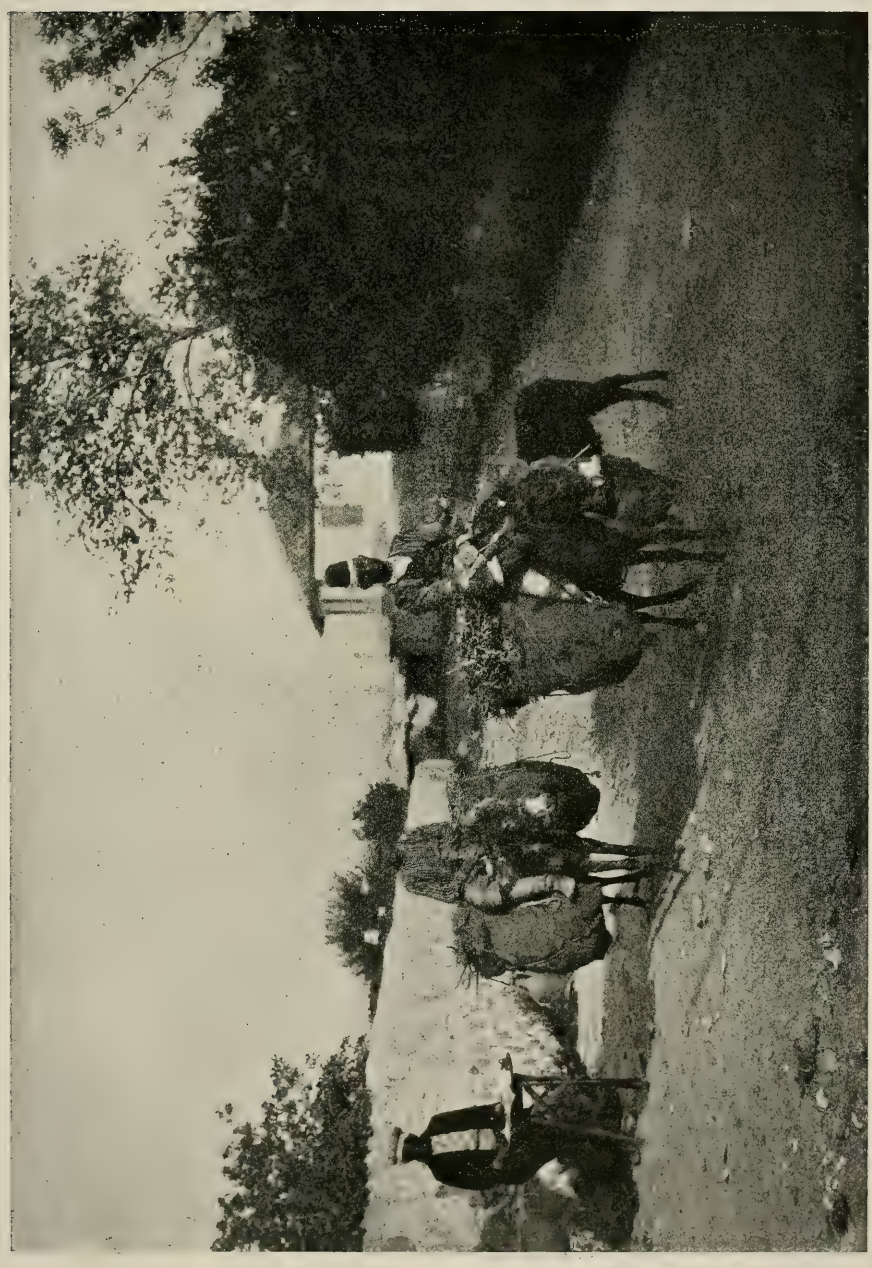
A WELL-PRESERVED TOMB IN THE NECROPOLIS OF COLOPHON. TYPE OF TURKISH MOUNTED POLICE



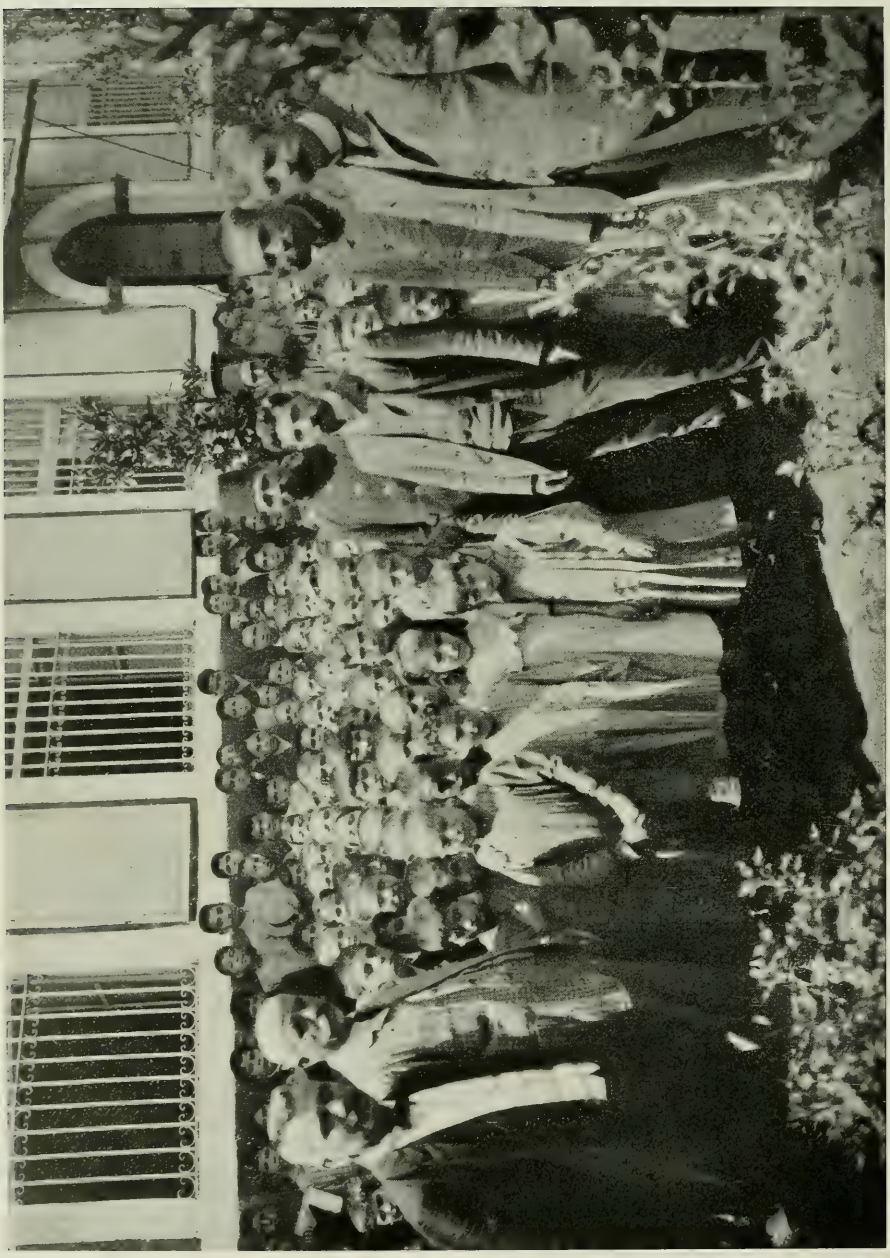
TYPE OF GREEK SHEPHERD NEAR COLOPHON



HERD OF GOATS ON A FARM NEAR ANCIENT COLOPHON



THE WAY LICORICE ROOT IS BROUGHT TO A STATION IN THE MÆANDER VALLEY



GREEK SCHOOL CHILDREN AND THEIR TEACHERS IN AIDIN, INTERIOR OF ASIA MINOR

There is still much to be excavated at Miletus. The work is in good hands, and in a few years Mr Theodore Wiegand, working in behalf of the Berlin Museum, will have laid bare the entire city.

PRIENE

Priene, thanks to the industry and energy of the Germans, is now completely excavated, something like eighty rectangular squares having been brought to the light of day. As the visitor at Pompeii sees before him an almost perfect Roman provincial town of the time of Pliny, so at Priene one is enabled to look at an Ionic city of the days of Alexander. The Germans have completed a wonderful work at Priene. The same thoroughness and workmanship with which they build a ship may clearly be seen in the skillful manner in which this city was brought to the light of day.

The chief interest in Priene is to be found in the private houses, which date from the fourth century B. C. The most of these houses show that they were occupied by people accustomed to luxury and art. There was a courtyard in the middle, as in most of the houses in the Orient today, upon which opened halls and chambers. In some of them were several sleeping rooms, and many had a second story. The walls of the first story in many houses are still standing, and decorations of various kinds may still be seen. Some idea will be given of the size of many houses when I state that they are 50 by 80 feet. The interior furnishings were also on a scale in keeping with the exterior proportions of the dwellings.

The houses in the coast cities of Asia Minor, even three thousand years ago, were fitted out with the most sumptuous tables, chairs, beds, and carpets. In other words, Hellenic genius and love of art was not only applied in rearing inimitable temples and statues, but the sense of the beautiful was also carried into the home.

Priene was a great religious center, and this accounts for the number and beauty of the temples.

It is not known when Priene was altogether abandoned by its inhabitants, but it is probable that the city was so thoroughly destroyed by an earthquake that its citizens retired to Ephesus and Smyrna.

COLOPHON

Colophon claimed to be the birthplace of Homer. About 665 years B. C. it was one of the most important cities in the Ionian Union, and celebrated far and wide for opulence and luxury. In 287 B. C. King Lysimachus removed a part of the inhabitants to Ephesus. With the exception of two or three wars, Colophon seems to have always had a pretty peaceful time of it, and during six hundred years of its history the inhabitants successfully pursued the arts of commerce and agriculture.

The horses of Colophon were the most noted in Asia Minor, and the forests grown upon the hills above the city were the special pride of the people. One might almost say that so much attention was paid by these people to their forests that the effects of the same, in this particular district, are felt to this day; for of all the trees I have thus far seen in the Vilayet of Smyrna there is nothing to compare with the magnificent pines which grow in the region of old Colophon—a pitiful remnant of the vast forests which must once have skirted the whole coast of this country. That the climate and soil of this section are wonderfully adapted to the production of timber is amply demonstrated by the presence of large quantities of edible mushrooms and other fungi usually unknown to dry atmospheres.

Colophon is surrounded by a great wall, which was constructed from the immense boulders of the surrounding hills. These rocks were chiseled into large squares and placed one upon the other without the use of cement. None of the ruins about Colophon are of Roman origin. Everything visible to the eye belongs to the very earliest period of Colophon's history.

The ruins of Colophon lie between two exceedingly picturesque Turkish villages. The artist who, through the encroachments of modern industrial enterprises, no longer finds in New England or elsewhere the old mill on the floss, the house with the seven gables, or the romantic wayside inn should pack up his easel and brushes and come to Asiatic Turkey. Here he will find subjects for his talents such as few other countries possess.

In the villages of Deirmendere and Trantsha, near Colophon, for example, he will find Turkish life and customs at their purest—such as they have ever been during the past six hundred years: Houses constructed of mud bricks with straw roofs; latticed windows, from behind which peer the encaged females; coffee-houses, wherein sit the turbaned Turk cross-legged, listlessly smoking a nargileh or sipping coffee in Oriental indolence; labyrinthian streets shaded by plane and poplar trees, with stately camels and dwarfish donkeys; majestic groves of cypresses, and neglected cemeteries studded with a wilderness of irregular headstones; on the minaret of the near-by mosque there is the never-failing stork; then there are brooks spanned by quaint bridges; around these villages there are green meadows enclosed by winding lanes; and beyond all these, in the background, rise up the rents of ruin—old Colophon.

It is a steep climb to the necropolis of Colophon, but the effort will be rewarded by the sight of many tombs, all of which, however, have been opened. Some of these tombs are built in the shape of square towers, but the greater part are either round or elliptical in nature, very similar in appearance to the tomb of Tantalus at old Smyrna, and evidently dating from about the same period. Today the necropolis is covered by a thick growth of tall pines, and the tombs must be searched for among the trees. At one of these large tombs the guide given me by Mr Van Lennep explained that when the interior of the tomb was opened two skeletons were found lying side by side, one of a man and the other of a woman, evidently husband and wife. The man was lying on his back and the woman on her face. Among the conjectures offered in explanation of this, one of the zaptiehs advanced the theory that the woman was buried face downward, so that the good lady could not talk too much in her sleep.

On descending from the acropolis we were met near the village of Deirmendere by a dignified Turk, who invited us to become his guest to the extent of having some coffee. I cheerfully accepted his hospitality and our host escorted us through the village, striding on before with an empty double-barreled shot-gun over his shoulder. His house consisted of two stories, one room above and one below, with a somewhat shaky stairway leading to the one above. Arriving there, we were informed that we could either take coffee in the yard below or in the room upstairs, which belonged to the ladies of the diminutive harem.

Upon our choosing to drink coffee upstairs, we were informed that the women must first be removed, and as we ascended the rickety stairs four of them were brought out on the small veranda and placed side by side with their veiled faces toward the wall while we filed past. For the first time I found myself in the dwelling-place of a village Turk of the lower class. There were no chairs in the room; two mattresses stretched on either side of a lighted fireplace were covered with Turkish rugs of the cheaper quality. Reclining upon these floor divans, we watched our host prepare the coffee.

It is a custom of the country mounted police to surrender their rifles to their host immediately upon entering the household, and in this instance our bodyguards laid their weapons on the floor. I learned upon this occasion that it is also the custom of the police, in this part of the country, to carry unloaded rifles—a circumstance which does not increase their efficiency, if they should be called upon to defend the stranger against brigands.

* To be concluded in the January, 1909, number.

OUR NEGLECTED SOUTHERN COAST

A Cruise of the Carnegie Institution Yacht "Physalia"

By Alfred Goldsborough Mayer

Director of the Department of Marine Biology of the Carnegie Institution of Washington

With Photographs by the Author

NO part of our Atlantic coast is less generally known than that which stretches from the mouth of Chesapeake Bay to northern Florida.

The coastwise steamships shun the proximity of the treacherous sands, and the curiosity of the average passenger respecting the shore is more than satisfied by a glance along the long, low line of dull gray strand trending in hopeless monotony to the obliteration of the horizon. Indeed, so low is this coast that Mount Cornelia, north of Saint Johns River, Florida, which is only 63 feet in height, is nevertheless the most elevated point between Norfolk, Virginia, and Key West, Florida.

One's interest in this coast develops only upon prolonged association with it, for there is in the vast expanse of its lonely swamp lands a mysterious attraction which, like a mirage, leads us onward though but to the allurement of our hope.

Exploration is greatly facilitated by the countless number of tidal creeks and estuaries which meander tortuously through the grassy flats, and by extensive sounds, such as those of Albemarle, Pamlico, Core, and Bogue, whose calm waters lie protected from the Atlantic waves behind narrow barriers of sand dunes.

Thus it is that with a vessel drawing five feet one may pursue a winding way through these creeks and sounds down nearly the entire length of this coast, and only occasionally be obliged to put out to sea. Indeed, the only considerable ocean passage is that between Beaufort, North Carolina, and Charleston.

Upon such an exploration one passes from the region of chestnuts and beeches, through the pine barrens of the Carolinas, to the palmetto groves of northern Florida; and thus from the temperate regions to the border lands of the tropics.

Nor is this region altogether one of desolate flats of swamp grass bending rhythmically to the breeze. It may even be beautiful, as where in North Carolina the Pasquotank River wanders through the avenues of an over-arching forest. Here, in the shadows of the fern thickets, under the canopy of the woods, is the haunt of the bittern, the heron, and the mink, in a region where primeval nature still knows naught of man's encroachment.

At Norfolk, Virginia, we leave behind us the hardwood of the Chesapeake region and enter a land where the tall, straight trunks of pine trees stand in stately monotony in every view. The trees keep a respectful distance apart, so that the noonday sun penetrates to their roots and falls upon the coarse grasses which cover this forest land. Here and there one sees a young pine tree resembling a green fox-tail thrust upright into the ground.

From northern Florida southward the ever-present bayonet-palm usurps the space under the pine trees. Its scaly, knob-like trunks interlace everywhere over the sandy soil, and only its low-lying clusters of serrated leaves thrust upward to the light. No forests are more uninteresting than are the pine barrens infested by the impenetrable thickets of this bayonet-palm. The hard yellow green of its bristling leaves obtrudes it-

YOUNG LOGGERHEAD TURTLES JUST AFTER HATCHING: LOGGERHEAD KEY, FLORIDA

self everywhere in dull uniform ugliness, a fit covering for the hideous rattlesnake.

Far different are the cypress, which cluster around the border of nearly every fresh water pool in the Carolina-Florida region. Their tall trunks stand like temple columns under the dark shade. Like huge misshapen fingers, the so-called "knees" of the cypress point upward above the stagnant water darkened by their exudations. Here, in the silent gloom, live the water moccasin, the vulture, and the alligator.

The live-oak, that noblest tree of our southern forests, flourishes from the southern parts of North Carolina southward. Its long, gnarled limbs, sweeping outward in contorted curves, present an un-oaklike appearance, but the relationship of the tree is seen in the wavy margins of its small, dark leaves and in the minute acorns. Southward from South Carolina the limbs of the live-oaks are infested by that beard-like plant, the "spanish moss," which, by the way, is not a moss, but a plant allied somewhat remotely to the pineapple.

Under these live-oaks we are in a somber region of twilight, where the boughs seem to whisper as their burden of drooping moss swings to and fro. Such is the canopy which a reverent nature has reared over the stately cemeteries where sleep those whose spirits ruled in the bygone days of the old South, when our nation still fostered a feudal aristocracy.

In the heart of the live-oak region lies quaint old Charleston, sleeping in the memory of its brave and eventful past. There is a decidedly French tone to its architecture, for here the Huguenot was dominant. Here the cultured spirit of colonial days still lingers, although the fine old walls are crumbling, and the delicate hue of lichens relieves the uniformity of coloring which they displayed in more

THE MOST NORTHERLY GROVE OF PALMETTOES, SMITH ISLAND, CAPE FEAR, NORTH CAROLINA

LIVE OAK AT SOUTHPORT, NORTH CAROLINA

THE SEA DESTROYING THE FOREST: COAST OF FLORIDA

THE OLD SPANISH FORT, MATANZAS INLET, FLORIDA

prosperous days. Everywhere are seen the mended crevices that are reminders of the days of earthquake a quarter of a century ago. Tiers of latticed verandas are the rule, and the roofs bear heavy old-fashioned tiles. There is a mournful dignity in the quiet city, living even now in the atmosphere of a time long gone; and nowhere is this felt more deeply than when in the moonlight one sees the line of the fine old houses that front the battery wall and set their faces toward the broad expanse of the harbor. The moon's rays glint along the barrels of old cannon that speak mutely of an historic past, and darkly outlined against the seaward horizon above the shimmering ripples of the bay lies old Fort Sumter. The grass may grow between the cobblestones of the streets along the water front, and the vultures may flock each morning to the ancient market roof; but do not these things comport with the repose of that patrician life which only the old South knew and the charmed memory of which still lingers here in Charleston, the aristocrat of American cities?

In our South the tangible things around us keep fresh the memory of things the North has long since forgotten: The lone chimney of the farmhouse burned in the civil war, the deserted mansion crumbling to decay, and under the live-oaks the many graves of those who died in the lost cause.

The palmetto is the most distinctive, but by no means the most attractive, tree of the South Carolina-Florida region. The most northerly natural grove of this palm is found close by the side of the beach of Cape Fear, at the southernmost extremity of North Carolina; but in northern Florida it constitutes whole forests and grows even upon the sandy beaches within a few feet of the breakers. Here, in combination with the yucca, the holly, and the cactus, it forms bristling thickets whose spiny leaves bid defiance to all intruders. Farther inland, however, along the moist

Photo from U. S. Forest Service

SAND DUNE OVERWHELMING A FOREST

banks of Florida streams, the palmetto alone is dominant, and between the columns of its clumsy trunks one sees the dark green of the magnolia.

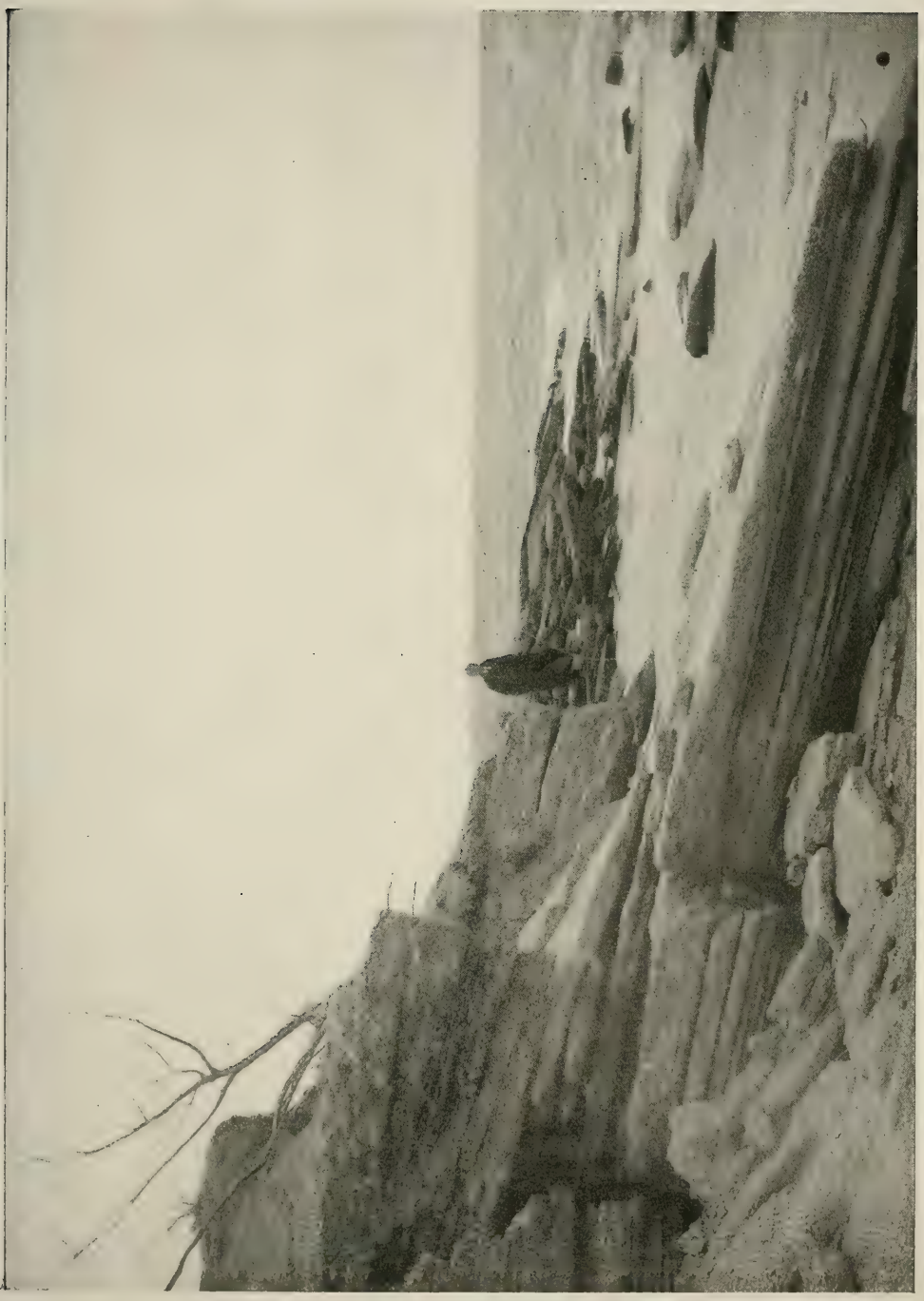
As we have seen, our southern seacoast consists of a long line of shifting sand-dunes, but none of these are so large or so attractive as are those near Provincetown, Cape Cod.

All phases in the formation and disappearance of sand-dunes may be observed along our southern beaches. Here the wind-blown sand may be seen engulfing the forest, and in another place the gaunt, gray trunks of the dead trees are again exposed to view, when the dune which overwhelmed them has itself begun to yield to the incessant breeze. The shore line fluctuates, and often the ocean may encroach upon and destroy the forest, or great flats of newly laid-down sand may stretch seaward from the old beach line. Ocean currents produce profound effects in shifting the loose sands, and Capes Hatteras and Canaveral are great cuspate forelands thrown up by conflicting shore currents.

The sand of the beaches consists mainly of broken granules of silex, the insoluble remnant of ancient granite rocks which have long since yielded to the incessant churning of the surf and to the even more potent disintegrating effects of rain, frost, and sea water.

All who visit Anastasia Island, opposite Saint Augustine, Florida, become familiar with the peculiar shell rock called "coquina," which furnished the stone for the construction of the fine old Spanish stronghold now called Fort Marion. This coquina is formed from broken fragments of sea shells which have been

SAND-SHAPES SCULPTURED BY THE WIND: FERNANDINA, FLORIDA



LEDGES OF COQUINA ROCK AT ANASTASIA ISLAND, FLORIDA (SEE PAGE 868)

tossed up upon the shore by winds and waves, and then have become cemented one to another, forming a coherent mass. This cementing of the originally separate bits of shell is due to the dissolving power which rain or sea water has for calcium carbonate, especially if the water be more or less impregnated with carbon dioxide, due to the decomposition of decaying vegetable or animal matter. Water thus charged dissolves the limestone of the shells, and then, if the solution evaporates on drying, the limestone is precipitated, thus fastening the shells together by means of little bridges of lime rock. So hard does this rock finally become that its surface rings with an almost metallic sound when struck with a hammer, and as long as frost does not affect it, weathering only serves to harden it still further. So well does this rock maintain itself in a warm climate that one may still discern the details of the coat of arms of Spain cut into the rock above the sally-port of Fort Marion at Saint Augustine.

We first meet with ledges of coquina rock on the shore of North Carolina, one of the most northerly being on the beach at the old Confederate Fort Fisher, north of Cape Fear. The shells here are largely mixed with silicious sand, but at Anastasia, Florida, the coquina is composed almost exclusively of shells. All of the rocky islands of the Bahamas are built up of fragments of sea shells and other limestone remnants of marine animals or plants. These fragments have been pounded into fine sand by the surf, and were then blown inland to be cemented by the rain water into rock. This wind, or æolian, rock, as it is called, forms hills fully 250 feet in height. A most interesting cut through it has been made at the "Queens Stairway," in Nassau, Bahamas, where the side walls reveal the effects of every wind-storm of the past in forming the rock.

Among the historic relics along our coast, none are more remarkable than the old Spanish fort at Saint Augustine, Florida, now inappropriately called "Fort Marion." It is the only pretentious mediæval building in North America, and, saving for the old guns which have unfortunately been removed, it is in a nearly perfect state of preservation, with moat, turrets, portcullis, sally-port, and crenated parapet, now gray with moss and lichens. Once it was Spain's proudest stronghold in North America, and although the Spanish king complained that for less cost he might have had a fort of solid silver, yet its worth was proven when in 1741 Oglethorpe's defeated forces retreated from its walls.

Much of the native charm of old Fort Marion has been destroyed through its accessibility to crowds of tourists; indeed, it is one of the few really interesting places along our southern coast which is easily reached.

Smaller than Fort Marion, but fascinating in its isolation, is the Spanish fortress of Matanca, near Matanzas Inlet, eighteen miles south of Saint Augustine. It stands upon the banks of a tidal creek in the midst of a desolate swamp. The settling of the old fort has riven the massive walls from base to summit. Trees cluster over the deserted parapet, where old cannon lie overthrown and covered by a tangle of vegetation. Owls and bats live in the rooms once occupied by its Spanish masters; yet in times gone by the old fort appears to have bravely withstood the shock of battle, for many fragments of iron shrapnel may be found buried within its coquina walls—possibly relics of Oglethorpe's unsuccessful siege.

Across the creek, by the side of this ancient fort, is the beach where, in 1565, Don Pedro Menendez de Aviles broke his promise of quarter to the captured French Huguenots and murdered Jean Ribault and 400 of his followers. For this dastardly act he was rewarded by the Spanish king by the title of "Marquis of Florida." The story is fascinatingly told by Parkman in his "Pioneers of France in the New World."

Apart from the cities of Charleston, Georgetown, and Savannah, which abound in reminders of the historic past, there are many other interesting places

Photo by Prof. Craig, of Cornell University

AN OLD SEAGRAPE ON ELLIOTT'S KEY, FLORIDA

The trunk has been twisted and battered by floating wreckage. Cocoanut palms in the background. The cocoanuts to the left have been hacked with the axe to make them bear. One gentleman in photo is drinking the water in a green cocoanut. The ocean is only a few feet distant.

A "NORTHER" ON THE FLORIDA COAST

along the line of the coast. Such are the strongholds of the civil war; among them Fort Fisher, the attack upon which is so interestingly described by Admiral Evans in his "Sailor's Log." There is also the beach at North Island, South Carolina, where, on the night of April 24, 1777, Lafayette landed in America.

Our southern coast is a region of sunshine free from the coastal fogs that are so common north of Cape Hatteras. In winter, however, beware of days when there is something almost liquid in the sparkling clearness of the sky and when a genial balm is in the air, for on a sudden great rolling masses of black clouds loom over the northern horizon and there comes roaring down upon one a wolf-like wind, the raw coldness of which can only be appreciated by those who have been its victims.

When all is said we must still be overcome by the impression of desolation and of gloom which is imparted by our southern coast. It is the region of the winding estuary, lost in an ocean of waving reeds; of gnarled old live-oaks, with their funereal pendants of Spanish moss dangling like old gray beards from the boughs; of dark stagnant pools, with the cypress towering like silent sentinels around their mysterious depths; of bristling thickets of bayonet-palm, and of monotonous wastes covered sparsely with the pine tree.

PAYING THE PENALTY OF WANTON WASTE

Everywhere one mourns the wanton destruction of interesting animal life, which might have been preserved to fascinate the naturalist and furnish legitimate sport for the hunter. The streams which once were the resort of myriads of water fowl are now silent and deserted. The wild turkey, the deer, and the bear are now very rarely met with. The alligator has become extinct over wide areas, the fisheries are declining, and the forests themselves are falling before the axe or withering under the wasteful bleeding of the turpentine industry.

In Florida especially the people have been most short-sighted in their failure to respect the game laws, and the state which might have retained unrivaled attractions for the sportsman and the naturalist has become largely barren of interest for both. Almost the only efficient protection of bird life in Florida is that under the auspices of the national Audubon societies, who, supported by private subscriptions, have in some measure succeeded in the preservation of the shore birds, although they must nearly always labor in opposition to the local sentiment of the people.

The impending ruin of the forests and extinction of the game in Florida are surely depriving the state of one of its chief attractions for the intelligent traveler. That something is not done to secure efficient conservation of Florida's existing resources of game and forests seems the more remarkable in view of the well-known result of the wiser policy of Maine, wherein their preservation has caused an annually increasing revenue to pour into the state, and this source of income is now the chief support of the population of its northern counties.

SCENES FROM THE LAND WHERE EVERYBODY DRESSES IN WHITE

THE interesting pictures of home life of the Korean given on pages 872-877 are from photographs by Rev. J. Z. Moore, a missionary to Korea of the Methodist Episcopal Board of Foreign Missions.

A TYPICAL CHURCH OF THE THATCHED ROOF TYPE AT SYO GOT, KOREA

NURSE GIRLS IN KOREA

Photos from J. Z. Moore

ALL PLOWING IS DONE WITH BULLS IN KOREA

HAY CARTS IN KOREA

Photos from J. Z. Moore

WOMAN WEAVING
DELIVERY WAGON IN KOREA

Photos from J. Z. Moore

Photo from J. Z. Moore

WOMAN UNWINDING THREAD TO PUT IN LOOM, KOREA

Photo from J. Z. Moore

WOMAN STARCHING THREAD AND PREPARING IT FOR LOOM, KOREA

A CANDY BOY

Photos from J. Z. Moore

TWO CHRISTIAN GRANDFATHERS, AGED 78 AND 80. KOREA

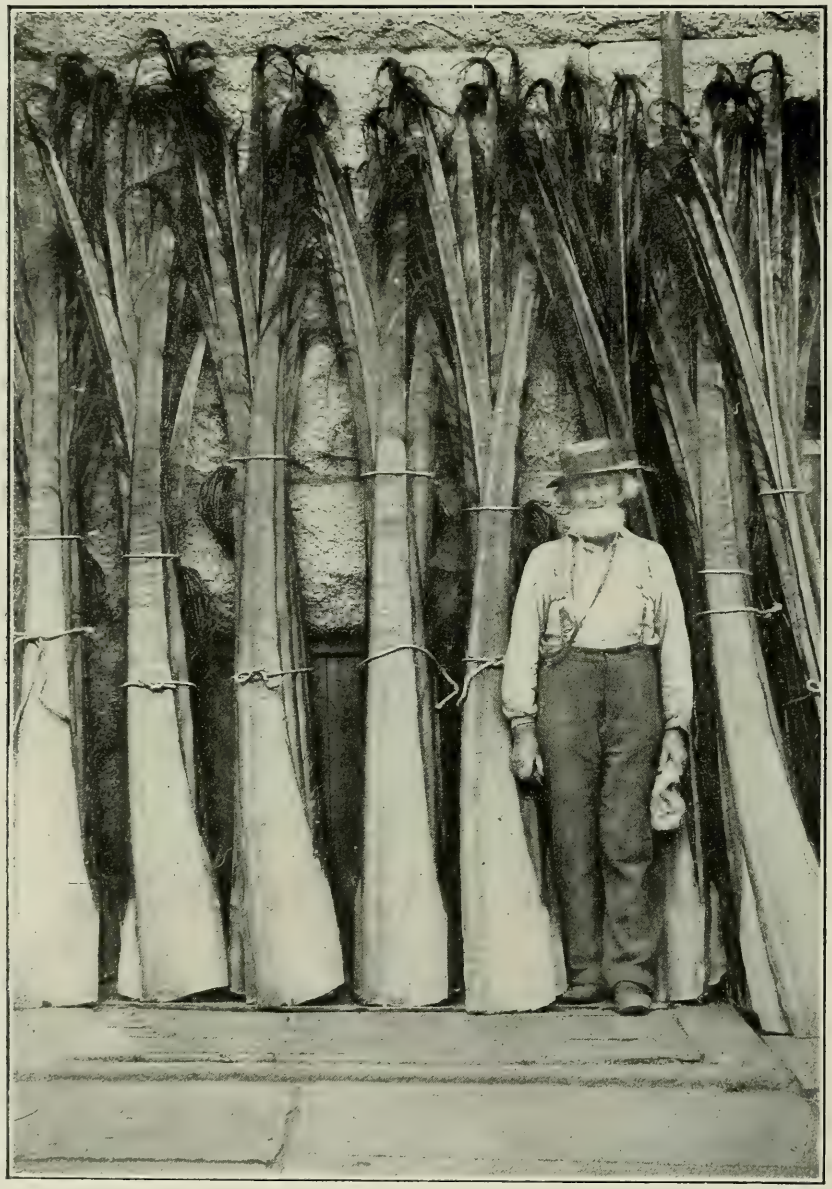


Photo from Charles H. Stevenson, U. S. Bureau of Fisheries

BUNDLES OF WHALEBONE AS RECEIVED AT THE FACTORY

(SEE PAGE 883)

Photo by A. W. McCurdy, Victoria, B. C.

SCENE AT THE WHALING STATION, SECHAR, ON THE WEST COAST OF VANCOUVER ISLAND

The little white specks seen on the body of the whales are barnacles. These are humpbacked whales. They are much dilated by air, which was pumped into them as soon as they were killed, so that they would float high in the water and thus be easily towed.

Photo by E. B. Gray, Azusa, California

A YUCCA, SEEN ON THE SLOPES OF MOUNT WILSON, CALIFORNIA

This illustration was sent to the Magazine by a California member of the National Geographic Society, who was much interested in the magnificent pictures of "The Magic Mountain," published in the July, 1908, number.

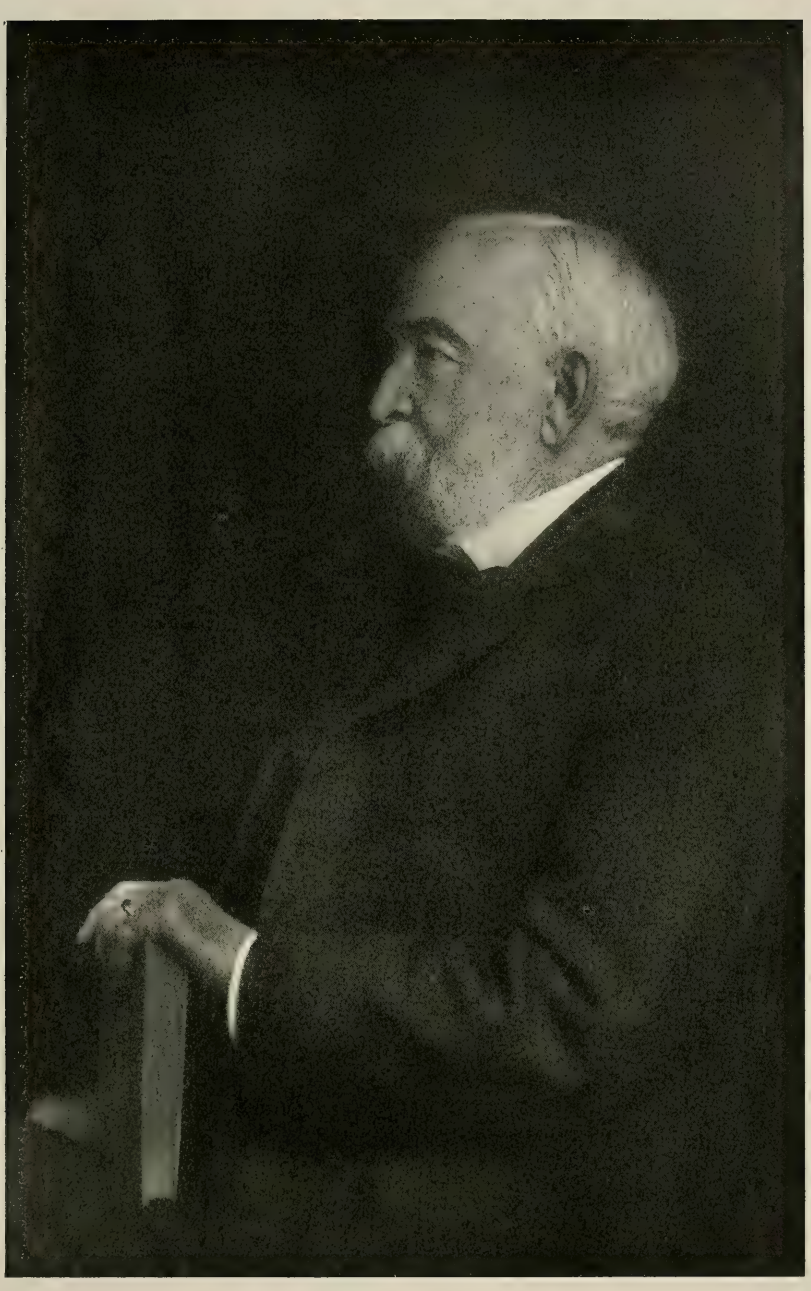


Photo by N. Schuman, Baltimore

THE LATE DANIEL COIT GILMAN (SEE PAGE 883)

Dr Gilman was actively associated with the work of the National Geographic Society from its organization in 1888, and a member of its Board of Managers from 1900 until his death.

Photo from Edwin A. Grosvenor, Amherst College

A BULGARIAN BRIDE AND GROOM

THE LATE DANIEL C. GILMAN

MEMBERS of the National Geographic Society and every person interested in geographic science will long remember the late Daniel C. Gilman for the leading part he has taken in geographical education and geographical work during the past fifty years. The first prominent position which Dr Gilman held was the chair of physical and political geography in Sheffield Scientific School from 1856 to 1872. He then acquired that liking and appreciation for the study of geography which characterized his professional career.

As President of the University of California, of Johns Hopkins University, and later of the Carnegie Institution, as author and again as editor-in-chief of the magnificent New International Encyclopedia, he always recognized the great importance of geographical research. Dr Gilman was one of the earliest members of the National Geographic Society and often addressed its meetings, and has always been actively identified with its work. The Society owes much to his kindly, encouraging, and broad-minded counsel freely given during 20 years.

THE PRODUCTION OF WHALEBONE*

IN the early days of the whale fishery the valuable qualities of whalebone were not well known, and comparatively little of the product was saved. The first importation into England is supposed to have been in the year 1594, when a quantity was picked up among the wreckage of a Biscayan ship.

An idea of the decrease in the supply of whalebone and the corresponding increase in value can be gathered when it is shown from statistics that in 1853 the total production in the United States was 5,652,300 pounds and the average value per pound thirty-five cents, while in 1906 the entire production was about 96,600 pounds, which sold at an average of $4.50 per pound!

*Consult "Whalebone: Its Production and Utilization," by Charles H. Stevenson. Bureau of Fisheries Document No. 626.

Of the whalebone taken by American vessels during the last twenty-five years, more than 90 per cent. has been secured in the Arctic Ocean, and the remainder mainly in Hudson Bay and in the Atlantic. The total product landed from the American fisheries during the nineteenth century exceeded 90,000,000 pounds, worth about $450,000,000 at the present market valuation.

The garniture of the mouth of the whalebone whales is totally different from that of the sperm whale. Instead of teeth, there is a strainer-like appendage called baleen, or whalebone, consisting of several hundred horny, elastic slabs or plates, which are attached to each side of the upper jaw. The number of slabs on each side ranges from 260 to 360. This number, as well as the length and quality, varies with the species and the size of the whale. The longest slabs are in the middle of each side, and they gradually decrease in length toward the ends of the jaw. When the whale's mouth is closed, the baleen fits into deep grooves; when the mouth is opened, the baleen springs forward so as to fill entirely the space between the jaws, permitting the water to pass through, but imprisoning the small mollusks upon which the animal feeds.

The lower edge of each slab of baleen, as it hangs from the upper jaw, is fringed with hair which resembles that of a horse's mane or tail, but is coarser and more brittle when dry. The external surface of the slabs has the appearance of enamel; the interior is fibrous and partakes of the nature of the hair-like fringe.

The material is regarded as a peculiar development of hair, each slab an agglomeration of hairs covered with enamel, and it is particularly interesting as indicating the transition from hair to horn.

The several species of bone-bearing whales yield baleen differing much in quantity, length, and quality. The choicest is from the bowhead of the Arctic Seas, yielding from 1,500 to 3,000 pounds each, the right-whale ranking

Photo by Herbert West

MALAYS IN NATIVE COSTUME: SINGAPORE

next with 1,100 to 1,300 pounds, while the average yield of the fin-back and hump-back is only about two hundred and fifty pounds from each animal, and of little value because of the poor quality and insufficient length.

The economic value of whalebone is due to its combined qualities of lightness, elasticity, and flexibility, even when split into very thin strips. It has also the property of permanently retaining any shape that may be given to it when it is heated, and then cooled under compression. It is therefore unrivaled as material for use in whips, corsets, for dress stays and similar purposes.

The cutting of whalebone—that is, changing the rough slabs into the forms and sizes suitable to the different uses—is carried on principally in New York City and Boston.

After delivery at the factory, in bundles containing 15 to 25 long single slabs which have been roughly cleaned, the first operation consists in cutting off the hair or fringe along the edge with a knife or a pair of shears. This hair ranges in length from two to eighteen inches, and is sold to brushmakers, who combine it with other bristle materials and use it in the manufacture of clothes-brushes.

Years ago whalebone was extensively used in making ribs for umbrellas and

A TAMIL BRIDE AND GROOM: SINGAPORE Photo by Herbert West

parasols, and was in demand for the manufacture of hoops, when that article of dress was fashionable. Another use was as covering for telescopes and other tubes, for this purpose the hair-like fringe and strips made from waste pieces being employed. These were employed also to make imitation haircloth for covering chairs and sofas.

The scarcity of whalebone has led to the introduction of many substitutes for use in corset and dressmaking, but so far few satisfactory ones have been found. Horn and rattan have been tried repeatedly without success, as they are liable to break and lack the resistance and lightness of whalebone.

AN AMERICAN SOUTH POLAR EXPEDITION

THE following communication from Commander Robert Edwin Peary, U. S. N., was presented by Herbert L. Bridgman, acting delegate of the United States of America to the Polar Congress recently held in Brussels:

"I beg to state that on my return from my coming Arctic expedition I shall endeavor, in every possible way consistent with my other duties, to promote and organize a national American Antarctic expedition to secure for this country its share of the honors and valuable scientific information still awaiting the explorer in that region.

Photo by Herbert West

CHINESE COOLIE WOMEN WHO WORK IN THE TIN MINES OF THE MALAY PENINSULA

CHINESE PEPPER PLANTATION, MALAY PENINSULA Photo by Herbert West

The pepper plant is supported by poles, as shown in the illustration, growing to a height of 12 or 15 feet, and yields two crops a year. In the middle ages pepper was one of the most costly of spices. The fruit is a bright red berry of about the size of a pea.

"The project would include the building of another special ship on the same general lines and in the light of the experience gained in building and using the *Roosevelt,* and the utilization of the methods and equipment evolved during my past seventeen years of Arctic work. It would not contemplate my personal association with the expedition in the field.

"While it is too early now to make any definite statement, it is hoped that the Peary Arctic Club may lend its encouragement to the work.

"This project, I am happy to state, has the approval of President Roosevelt.

"At a subsequent session of the commission it is hoped to offer a more detailed presentation of the matter for such action or suggestions as the commission may see fit."

NATIONAL GEOGRAPHIC SOCIETY.

THE annual banquet of the National Geographic Society will be held on Tuesday evening, December 15, at 7.30 o'clock, in the large banquet hall of the New Willard Hotel, Washington.

The dinner this year will be in honor of the United States Navy, and the guests of honor will include the Vice-President and Mrs Fairbanks, the Chief Justice of the United States, Mr Melville W. Fuller; the Secretary of the Navy and Mrs Newberry, the Attorney General, the Secretary of Agriculture, Admiral Robley D. Evans and Mrs Evans. The Society will also have as its guests distinguished representatives of foreign countries and of official circles. At the conclusion of the dinner there will be brief toasts by the Vice-President, by Mr Newberry, Admiral Evans, Miss Mabel Boardman, Secretary of the Red Cross, and Mr William E. Curtis. The event promises to be even more enjoyable than the banquets of 1906 and 1907.

The subscription is $5.00 for each plate. Members have the privilege of bringing guests with them at the same price per plate.

December 11—"The Redemption of Ireland," by Mr William E. Curtis. No longer does the Irishman in Ireland live on potatoes and peat. Illustrated.

December 18—"Present Conditions in Turkey," by Dr Howard S. Bliss, President Syrian Protestant College, Beirut.

January 4—"The Sierra Nevada," by Dr Grove Karl Gilbert. Illustrated.

January 8—"A Digger's Work in Palestine," by Dr Frederick J. Bliss, author of "A Mound of Many Cities," "Excavations in Palestine," etc. Dr Bliss has been conducting important excavations in Palestine for 20 years. In one mound he found eight cities buried one under another. Illustrated.

January 15—"The Non-Christian Tribes of the Philippine Islands," by Dr Frederick Starr, of the University of Chicago.

January 22—"The Panama Canal and the Spanish Main," by Mrs Harriet Chalmers Adams, author of "Wonderful Sights in Andean Highlands," "Land of the Incas," etc., in the NATIONAL GEOGRAPHIC MAGAZINE. How 40,000 men are making the dirt fly at Panama; how they are cared for; their mess halls and amusements. With an excursion to the Spanish Main. Illustrated with lantern slides and moving pictures.

January 29—"Abraham Lincoln—Boy and Man," by Mr W. W. Ellsworth, of the Century Co. The year 1909 is the centenary of Lincoln's birth.

February 5—Major General A. W. Greely, U. S. Army, will address the National Geographic Society. The subject of this lecture will be announced later. Illustrated.

February 12—"The Bird Islands of Our Atlantic Coast," by Mr Frank M. Chapman, of the American Museum of Natural History. Illustrated with lantern slides and moving pictures of the pelicans and fish hawks.

February 19—"Java—The Garden of the East," by Mr Henry G. Bryant. Mr Bryant, like the majority of travelers, describes this island as "the most beautiful and fascinating region in the world." Illustrated with lantern slides and moving pictures.

February 26—"Aërial Locomotion," by Mr Wilbur Wright or Mr Orville Wright.

March 12—"The Hunting Fields of Central Africa," by Mr Gardiner F. Williams, author of "The Diamond Mines of South Africa," and for 20 years general manager of the De Beers diamond mines at Kimberley. Illustrated with lantern slides and moving pictures.

March 19—"Ruwenzori, the Snow Crowned Mountain of the Equator," by Prof. Edwin A. Fay, of the Tufts College, President American Alpine Club.

March 25—"Brittany—The Land of the Sardine," by Dr Hugh M. Smith, Deputy Commissioner of the U. S. Bureau of Fisheries.

April 2—"Homes for Millions—Reclaiming the Desert," by Mr C. J. Blanchard, of the U. S. Reclamation Service. Illustrated with lantern slides and moving pictures.

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Vol. II, Page 167, American Edition.

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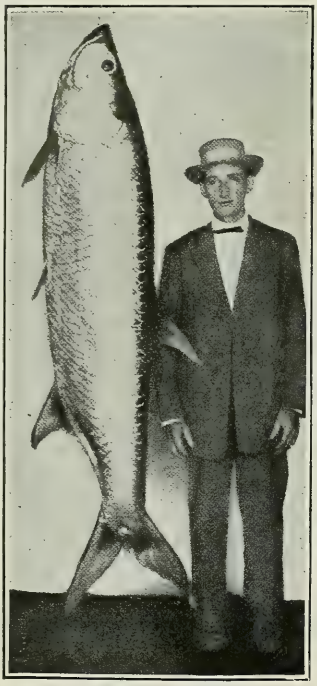

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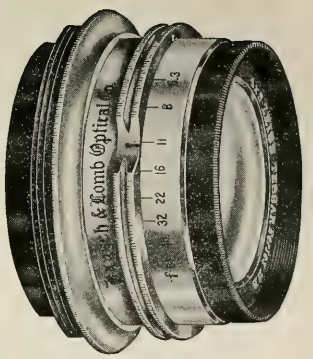

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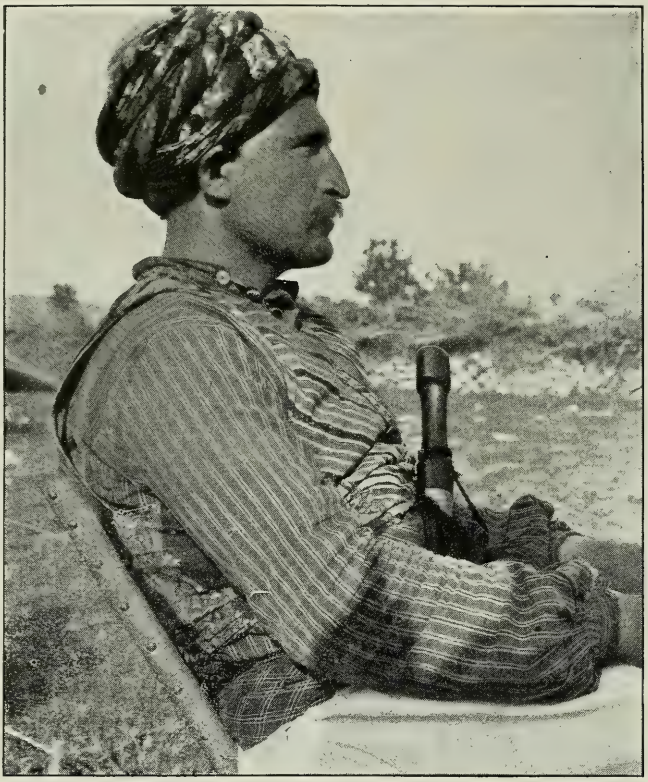

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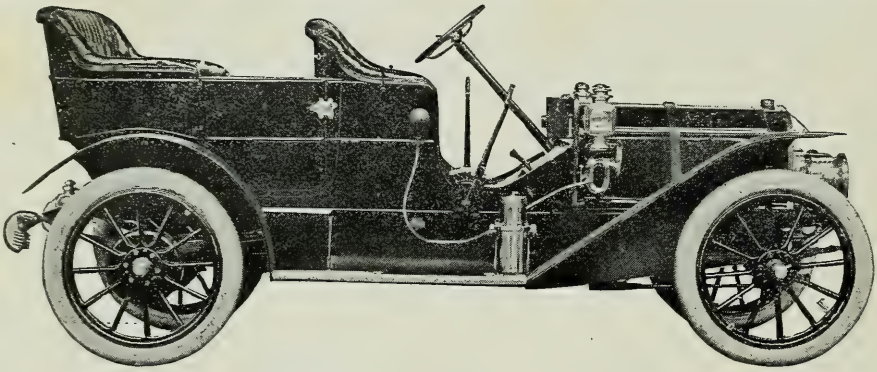
Rambler ~ 1909



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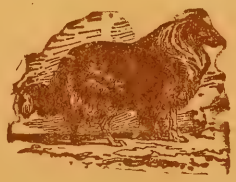

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